

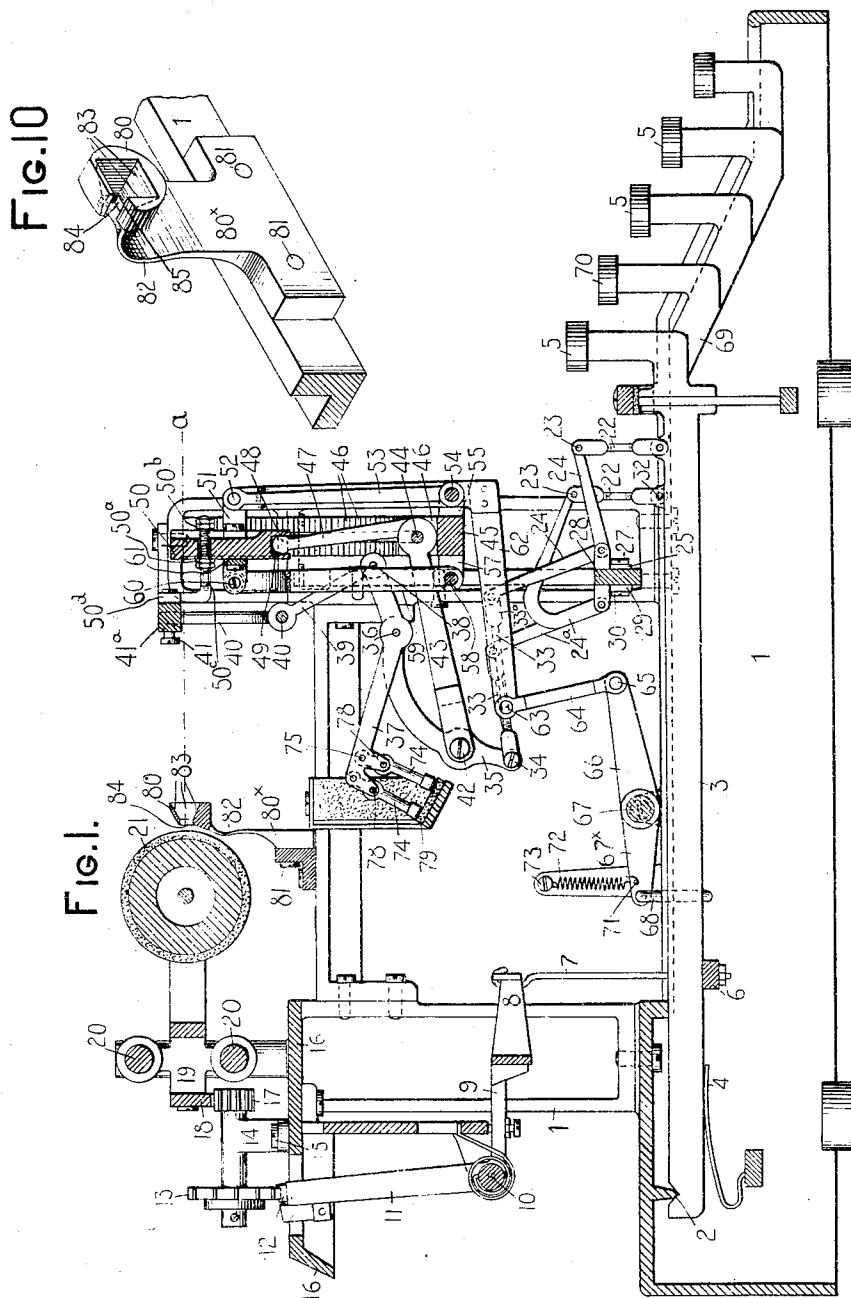
No. 823,010.

PATENTED JUNE 12, 1906.

C. W. WALKER.
TYPE WRITING MACHINE.

APPLICATION FILED JAN. 16, 1902.

5 SHEETS—SHEET 1.

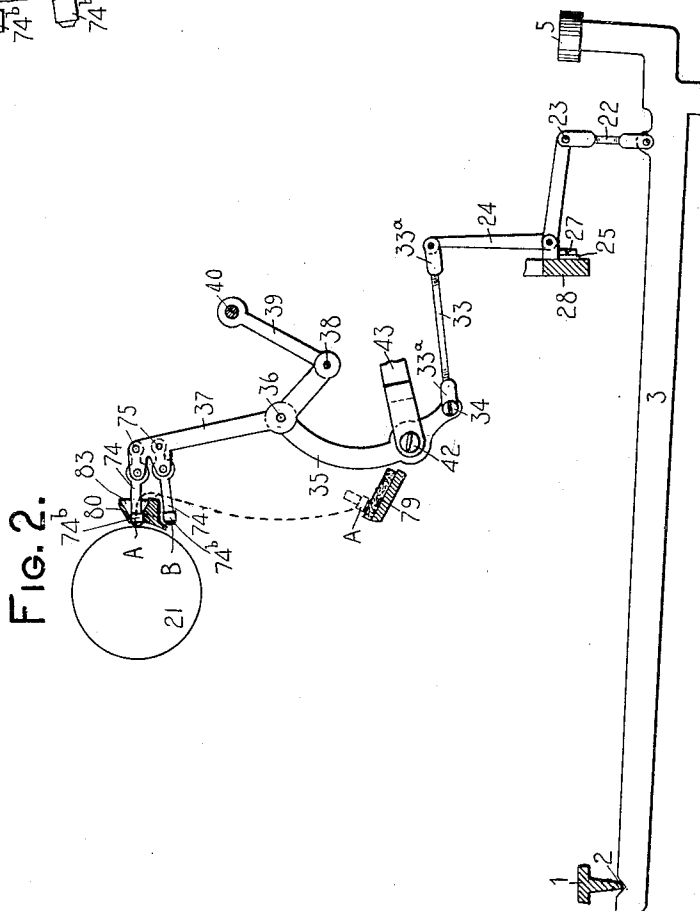
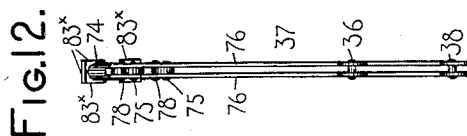
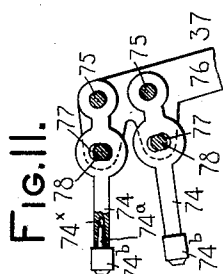


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5 SHEETS—SHEET 2.



WITNESSES:

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INVENTOR:

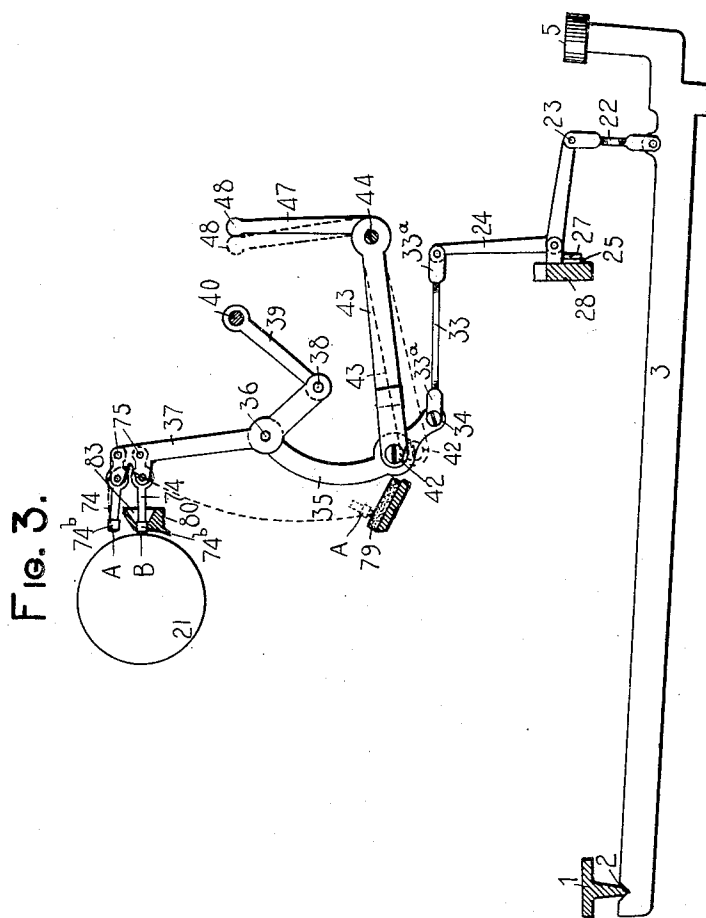
Charles W. Walker
by Jacob F. Fabel
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5 SHEETS—SHEET 3.



WITNESSES.

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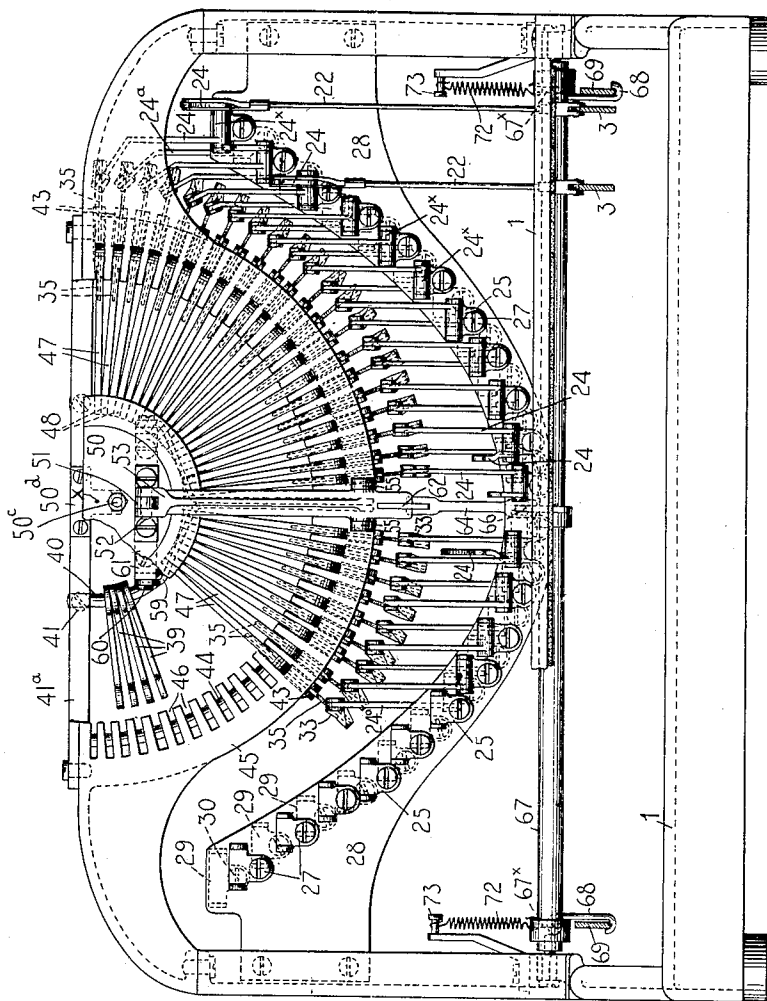
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5 SHEETS—SHEET 4.

FIG. 4.



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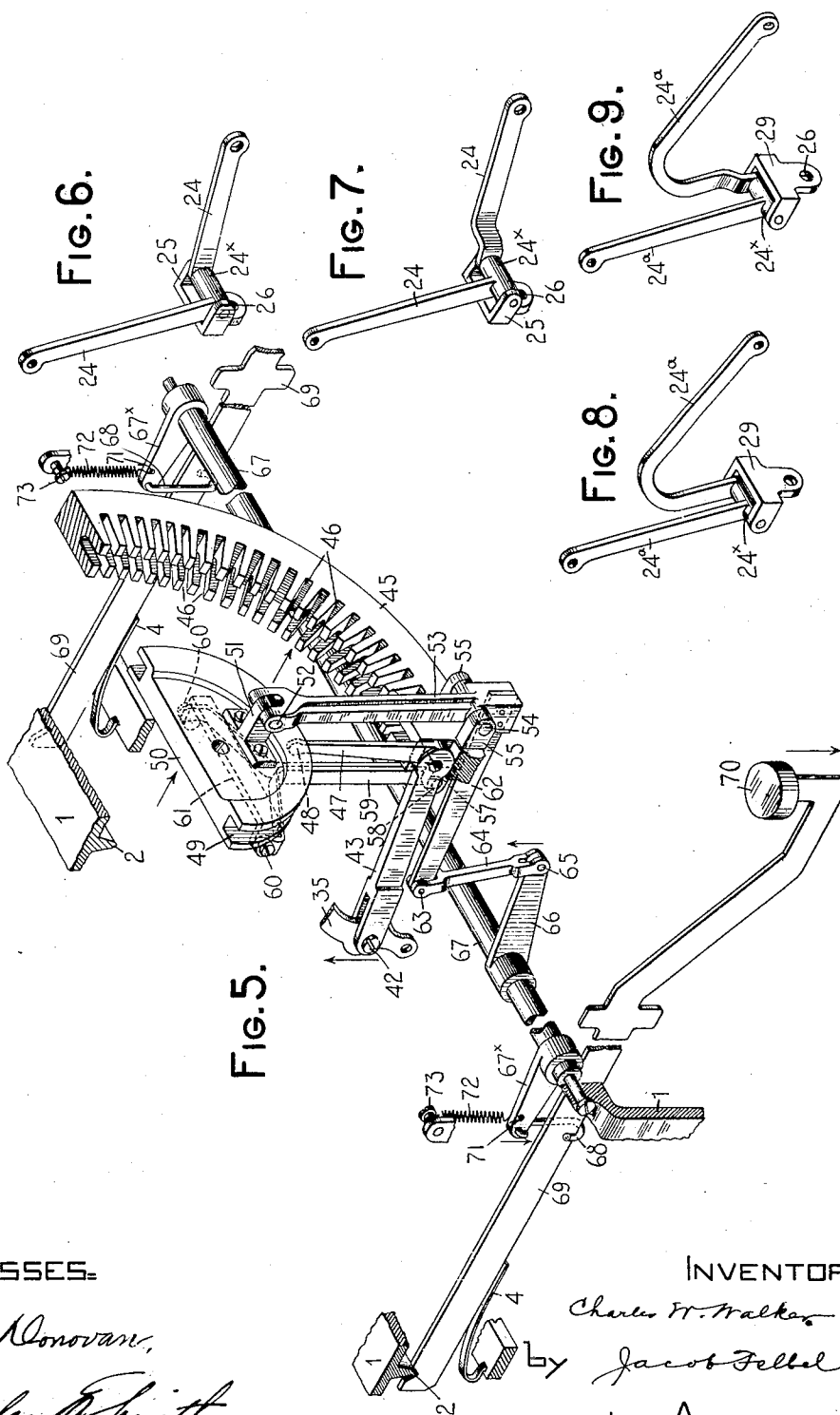
HIS ATTORNEY

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5 SHEETS—SHEET 5.



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UNITED STATES PATENT OFFICE.

CHARLES WELLINGTON WALKER, OF BRIDGEPORT, CONNECTICUT,
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TYPE-WRITING MACHINE.

No. 823,010.

Specification of Letters Patent.

Patented June 12, 1906.

Application filed January 16, 1902. Serial No. 90,020.

To all whom it may concern:

Be it known that I, CHARLES WELLINGTON WALKER, a citizen of the United States, and a resident of Bridgeport, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Type-Writing Machines, of which the following is a specification.

My invention relates to type-writing machines, and is directed mainly to the type-bar action and to the mechanism for shifting the parts so as to change from one case to another in order to print with any one of a plurality of types on each type-carrier; and the invention is further directed to the type-guide construction for guiding the types in proximity to the printing-point.

My invention consists in certain features of construction and arrangements of parts, as will be hereinafter described, and particularly pointed out in the claims.

In the accompanying drawings, wherein like reference characters designate corresponding parts in the various views, Figure 1 is a vertical sectional view from front to rear of one form of type-writing machine embodying my invention. Fig. 2 is an isolated detail side view of one of the type-bar actions, the view illustrating one of the lower-case type at the printing-point. Fig. 3 is a like view of the same, showing the parts shifted to bring one of the upper-case type to the printing position. Fig. 4 is a front view of the machine, with parts broken away and others omitted for the purpose of more clearly showing other parts. Fig. 5 is a detail perspective view of the case-shifting mechanism. Fig. 6 is a detail perspective view of one of the type-bar-actuating bell-cranks and hangers employed at the front of the segment. Fig. 7 is a live view of another of said bell-cranks and hangers. Fig. 8 is a detail perspective view of one of the bell-cranks and hangers used at the rear of the segment. Fig. 9 is a like view of another of the bell-cranks and hangers employed at the rear of the segment. Fig. 10 is an enlarged detail perspective view of the type-guide. Fig. 11 is an enlarged detail side view of a portion of one of the type-bars with one of the side plates removed to clearly show the means for connecting the type-holders to the bar. Fig. 12 is a detail front edge of a type-bar.

In the framing 1 of the machine are fulcrumed at 2 key-levers 3, which are preferably parallel and are maintained in the normal position by springs 4 and are provided with the usual finger-keys 5. Extending beneath the key-levers 3 is a universal bar 6, which is connected at its ends to upright links 7, that in turn are connected to a transverse bar 8, that is secured to an arm 9, projecting from the rock-shaft 10 of the dog-rocker 11. The feed-dogs 12 on the dog-rocker coöperate with a feed-wheel 13, which is operatively connected to a shaft that extends through a fixed bearing 14, secured at 15 to the top plate 16 of the machine.

The forward end of the shaft referred to is provided with a feed-pinion with which a feed-rack 18 coöperates. The feed-rack 18 is carried by a carriage 19, that moves upon suitable traverse-rods 20, supported upon the top plate 16, and the carriage supports a platen 21. Each of the key-levers 3 is connected to a straight draw-link 22, which is pivoted at 23 to a bell-crank lever 24 or 24^a, as the case may be, and the various bell-crank levers are provided with elongated pivotal bearings 24^x, to which the crank-arms are connected at various points in the lengths of said bearings. All of the bell-crank levers 24 are vertically arranged and are pivoted to hangers 25, that are segmentally arranged and are each apertured for the reception of a screw 27, by means of which the bell-cranks 24 and their hangers may be secured to the front of a vertically disposed segment or segmental support 28. Hangers 29 are secured by screws 30 to the rear face of the segment 28, and these hangers support the rear set of bell-crank levers 24^a. The hangers 25 and 29 are the same in construction and are secured in the same manner to the segment 28, though the hangers upon opposite sides of the segment are staggered or alternate, as will be seen upon reference to Fig. 4, wherein the front series of hangers are each mounted out of alinement with the hangers upon the opposite side of the segment. By this arrangement of hangers and bell-cranks a large number of bell-cranks may be mounted in a comparatively small space, considered widthwise of the machine, which is substantially coextensive with the width of the keyboard and without

unduly crowding the parts and without detracting from the strength thereof by reducing the size of the parts. From an examination of Figs. 1, 4, 8, and 9 it will be seen that this staggered arrangement of the hangers and bell-cranks permits one arm of each of the rear series of bell-cranks 24^a to be bent forward, so that it extends between the upright arms of the forward set of bell-cranks and may each be connected to a straight draw-link 22, which in turn is pivoted at 32 to a key-lever, so that while the bell-cranks are upon opposite sides of the segment 28 they all connect with their key-levers forward of the segment, and a substantially equal leverage is provided throughout the various actions. Each of the bell-cranks 24 and 24^a has one arm thereof connected to a draw-link 33, which has its inner end pivoted at 34 to a driving-lever 35. These links may be twisted, as shown in Fig. 4, or may be round links which are screw-threaded at their ends, where they are received in the connecting ends 33^a, as represented in the other figures. Each driver 35 is pivoted at 36 between the ends of a type-bar proper, 37, which latter is pivoted at 38 to a pivoted guide-link 39, so as to constitute what is known as a "jointed" type-bar. The upper end of each guide-link is pivoted to a segmental pivot-wire 40, secured at 41 to a fixed cross-bar 41^a. Each driver 35 is likewise pivoted at 42 intermediate its ends to a supporting-lever 43, that constitutes one arm of a bell-crank lever which is pivoted on a segmental wire 44, that is supported by the vertically-disposed segment 45 and is adapted to move around said pivot-wire in a radial slot 46, formed in said segment, so that each type-bar proper, 37, swings around four centers—one, the swinging pivot 38, another, the fixed pivot 40, the third, the pivot 42 of the driver for the type-bar, and the fourth the swinging pivot 36—in the same general manner as the type-action in the Yost machine. The arm 47 of each of the radially and segmentally arranged bell-cranks 43 to 47 is rounded at 48 and projects into the slotted edge 49 of a segmental shift-plate 50. To the shift-plate 50 is secured a bracket 51, which is pivoted at 52 to a lever 53, that is pivoted near its lower end at 54 to a bracket 55, that extends from the forward face of the fixed segment 45. Extending from the rear face of this fixed segment is a bracket 57, to which is pivoted at 58 another link 59, that is pivoted at its upper end 60 to a bracket 61, which is secured to the rear face of the shift-segment 50. It will thus be seen that the segmental shift-plate 50 is mounted and supported upon parallel links 53 and 59 and is adapted to move on said links in a horizontal plane and that this movement of the shift-plate 50 produces radial movements of the various supporting-levers 43. The link 53 is extended down-

wardly beyond its pivot and is rigidly connected to an arm 62, that has its rear end pivoted at 63 to a link 64, which in turn is pivoted at 65 to an arm or lever 66, that is secured to a rock-shaft 67. This rock-shaft 67 likewise has arms 67^x projecting rearwardly therefrom, the rear end of each of which is provided with a depending hook or strap 68, that takes around an actuating or shifting lever 69, which is fulcrumed in the same manner as the character-key levers and is provided with a finger-key 70 at the keyboard of the machine. Each of these arms 67^x may be connected-at 71 to a spring 72, which has its opposite end secured at 73 to a suitable fixed portion of the machine.

From the foregoing description it will be understood that a depression of either key 70 will cause the link or arm 53 to be vibrated on its fixed pivot, thus causing the upper end of the link or arm, together with the segmental shift-plate connected thereto, to be moved toward the front of the machine. This movement of the segmental shift-plate will cause all of the segmentally and radially arranged bell-crank levers 43 to 47 to be vibrated on their common fixed pivotal wire 44, and thereby move the arm 43 of each lever inwardly or radially toward the center of the system, each arm 43 vibrating in the same radial plane that its associated type-bar moves in and the rear end of each of the links 33 moving or swinging with its connected arms 35 and 43. The effect of this radial shifting movement of the arms 43 is to change the position of the pivotal center 42 of each type-bar driver, so that when a character-key is actuated the path of movement followed by the type-bar will be changed, and the upper-case type will be brought to the printing-point, as indicated in Fig. 3 of the drawings, though each type-bar will move at all times in the same radial plane, whether for upper or lower case printing. In Fig. 3 the dotted line position shows the normal or lower-case printing position of the supporting-lever 43 47, whereas the shifted or upper-case position is represented in full lines.

From what has been said it will be understood that the type-bar follows one path of movement in printing a lower-case character and follows another path of movement in printing an upper-case character, but that, nevertheless, it always moves in the same radial plane.

Referring to Fig. 2, the lower-case type A is represented as at the printing-point in full lines and in dotted lines in its normal position at the pad, and between these two points is shown a dotted line which represents substantially the path of movement of the lower-case type from normal position to printing position. At Fig. 3 the lower-case type is shown in dotted lines in its normal position

and as above the printing position in full lines, and the dotted line connecting the lower-case type in its two extreme positions represents substantially the path of said type when the parts have been shifted to enable the upper-case type to print, and which upper-case type B is shown as at the printing-point.

It will be observed that the path taken by the lower-case type when the parts are in their shifted positions is different from and longer than the path of said type when the parts are in their non-shifted positions. Similarly the upper-case type travels through different paths and paths of different lengths when the parts are respectively in normal and shifted positions; but these varying paths of the upper-case type are not shown by dotted lines in order to simplify the views and avoid confusion.

Normally the shift-plate 50 bears against and is stopped by the rear nut 50^a; but when shifted said plate strikes against and is arrested by the forward nut 50^b. These nuts are adjustable on threaded rod 50^c, which passes freely through the shifter-plate and is supported by bracket 50^d, attached to the cross-bar 41^a.

From an inspection of Fig. 4 it will be seen that the various type-bars, drivers, and supports 43 are mounted in planes that radiate substantially from the point indicated by the letter *x* in said figure and that in the operation of the machine the type-bars and drivers (and which drivers may be considered as parts of the type-bars) move in these same planes both when the parts are in the normal position and when in the shifted position. The supports 43, which effect the change of case, likewise move in the same radial planes in which the type-bars move.

From a comparison of Figs. 1 and 4 it will be observed that the point *x*, heretofore referred to, is in the same horizontal plane with the printing-point and the axis of the platen, as is indicated by the dotted line *a* in Fig. 1. By reason of the above features of construction I am enabled to make all of the type-bars without lateral bends at the type ends of the bars and to arrange the types one behind the other in the planes of the type-bars and with the printing-faces of all of the types at right angles to said planes. Straight type-bars or those without lateral bends and wherein every portion of the type-bar moves in a single plane and those wherein the printing-faces of the types are at right angles to said plane throughout the system have many advantages over type-bars having lateral bends where the types are placed and over straight bars where the types are offset or overhang and over type-bars wherein the printing-faces of the types are at angles other than right angles to the plane of movement

of the bar which carries said types and are at varying angles throughout the system.

In prior machines it has always been customary, as far as my knowledge extends, either to bend the outer type ends of the bars more and more as they approach the sides of the segment or circle, where each type-bar is to be provided with a plurality of types, as upper and lower case types, or else to make the type-bars straight from end to end and place the upper and lower case types thereon at gradually-increasing angles, working from the middle of the machine outwardly in both directions or to have the printing-faces of the types at different angles throughout the system relatively to the planes of movement of the type-bars. It results from these constructions last described that the types are offset from or overhang the major axis of the type-bar and not only take up more room in the basket as the sides of the machine are approached, but such type-bars print with a crank-like action and produce faulty and objectionable impressions or that the faces of the types will strike the platen in a plane other than at right angles to the plane of movement of the type-bar, and a faulty impression will result.

In my construction it will be observed that there are no lateral bends in the type-bars at any part of the segment and that no one of the types on any of the bars is offset from or overhangs its bar. The types being arranged one behind the other and in the plane of the bar each type will be supported by the body of the bar itself during the impact of the type, and the hitherto offset or crank impressions are thus avoided. The faces of all of the types meeting the platen at right angles to the planes of movement of the type-bars prevent blurring impressions. Moreover, I am enabled by my construction to provide a greater number of type-bars in a given space than any other machine wherein there are a plurality of types on a bar and wherein the types are offset from the main body of the bar.

It will be understood that by reason of the fact that the types are arranged one behind the other, as explained, and that in the shifting of the parts for upper and lower case printing the parts all move in radial lines, I may provide an indefinite number of types on each type-bar, adding, of course, the necessary number of shift-keys for the different number of shifts required—that is to say, each type-bar may have three or more types and may have two or more shifts accordingly.

Upon reference to Figs. 11 and 12 it will be seen that each elongated type-holder 74 is pivoted at 75 between the side plates 76 of each type-bar 37 and that each type-holder is provided with an elongated opening 77, through which a pin 78, secured to plates 76,

extends. Each type-holder has a tapering recess at 74^x for the reception of a tapering stem 74^a, which projects from a type-body 74^b, so that each type-body may be turned, with its stem, to properly position the face of the type on its holder. The pin-and-slot connection between each type-holder and its type-bar adapts the type-holder to move on its pivot independently of the movement of the type-bar. This independent movement of the type-holder on its bar answers a twofold purpose in the present instance. It enables the type to be properly centered in the type-guide in the movement of the type to the printing-point, and it likewise enables the face of the type to be maintained properly positioned on the fixed segmental inking-pad 79, whether the parts be in the normal position to write lower-case characters or be shifted to write upper-case characters. In other words, the slight movement which is imparted to the various type-bars 37 by an operation of the shift-key 70 is ineffective to displace the face of the type from the inking-pad by reason of this independent movement of the type-holders and their type bars or carriers. It should be understood, however, that the invention is not restricted to the use of types which move with relation to their type bars or carriers and that the case-shifting mechanism may be employed in connection with type-bars wherein the types or their holders are fixed to the bars. Also the invention is not limited to jointed type-bars.

While it is one of the objects of the invention to produce a front-strike machine in which the types are inked by a pad and print directly on the paper without the interposition of the usual inking-ribbon, nevertheless some features of the invention may be embodied in machines wherein an inking-ribbon is employed instead of an inking-pad.

Situated adjacent to the printing-point is a type-guide 80, whose bracket or support 80^x is secured at 81 to a fixed portion of the machine. The support or bracket 80^x of this type-guide is bent at 82 to provide a clearance for the upper-case-type holders, elongated stems or supports when the lower-case-type holders or stems are within the guide, as indicated in Fig. 2, and the bracket 80^x is secured to the rear portion of the guide in order not to interfere with the type outside of the guide. The type-holders, elongated stems, or type-supports 74 on each type-bar, are arranged at such distance apart as to leave sufficient space between them to permit either type to pass outside the guide when the other type passes through the guide in its movement to the printing-point, the walls of the guide being of less thickness than the space between the stems or supports of each type. The body of this type-guide 80 is substantially cylindrical exteriorly and is provided with inner guiding-faces 83, that are

adapted to surround the type-body upon all sides. There are preferably four of these faces, so that the internal opening is rectangular in cross-section to cooperate with four faces 83^x (see Figs. 11 and 12) on each type-body to properly guide the type to the printing-point and to properly center it in the type-guide. The faces 83 are inclined in the usual manner toward the type-opening 84 and are, in effect, angular walls of the guide-opening which surround upon all sides the angular sides of the type-body. The upper left-hand corner of this type-guide is cut away at 85, and this corner of the guide is preferably beveled on the outside toward the rear thereof, so that the operator may examine the last-written character without moving the platen to either side of the type-guide. It will be understood that it is preferable to cut away the upper left-hand corner of the type-guide, because of the fact that the opening 85 will thus be provided at that side of the guide toward which the platen moves in its usual letter-space-feed movement. By reason of the general cylindrical contour of the outer face of the type-guide it enables a free space to be provided at every point around the guide for the type-holders which are not carried to the printing-point during the actuation of the keys, but which must be maintained either above or below the type-guide or to either side thereof when various bars are brought successively to the printing position. Thus when one of the keys at the center of the keyboard is actuated to print a lower-case character then the other type and its holder or stem on the same type-bar will take a position below the guide, as represented in Fig. 2 of the drawings, whereas when one of the same keys is actuated to print an upper-case character the other type and its holder or stem on the bar extends above the type-guide, as represented in Fig. 3 of the drawings. It follows that the thickness of each wall of the guide is such that it will permit the types or their stems to straddle the guide at every point—that is to say, the thickness of the walls of the guide is such that they are adapted to extend between the types, so that one type on a bar may be outside the guide when the other type on the same bar is within the guide and at the printing-point.

From an examination of Figs. 4, 6, 7, 8, and 9 it will be seen that the pivotal bearing 24^x of each lever 24 or 24^a is considerably wider than the arms thereof. It will also be seen by comparison of these levers in Fig. 4 that the arms of the different levers connect with the bearings 24^x thereof at different points in their widths. By these means a steady and efficient bearing of considerable width is provided for each lever, and the hangers may be mounted in step-shape order without interference and the securing-screws thereof placed at substantially regular dis-

stances apart, though the distances between the arms of the various levers may vary. Thus upon reference to Fig. 4 it will be seen that the arms of the levers 24 and 24^a are spaced farthest apart at the center of the segment and the spaces between them gradually decrease as either side of the segment is approached. This facilitates the connection between the various levers and their drivers and key-levers without the necessity of providing an irregular mounting of the hangers. It will likewise be seen that the upright arms of the levers 24 and 24^a are parallel throughout the segment, those at the extreme sides being bent inwardly at their upper ends to facilitate the connection with their associated links.

While I have shown and described the various features of my invention in a "front-strike" type-writing machine, they or some of them may be applied to other styles of type-writing machines.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a front-strike type-writing machine, the combination of a platen, a system of radially-arranged type-bars that swing upwardly and rearwardly and impact against the front face of the platen, each of said type-bars having a plurality of types and all of the types on each bar being arranged in the radial plane of its bar and having their printing-faces at right angles to said plane, each type bearing essentially the same relation to its bar in the printing position that it does in the normal position.
2. In a type-writing machine, the combination of a system of radially-arranged type-bars, each type-bar of the system having a plurality of types arranged one behind the other in the plane of the bar, means for supporting said type-bars, and means for shifting said supporting means radially and maintaining the same fixed in either the normal or shifted position.
3. In a type-writing machine, the combination of a platen, a system of radially-arranged type-bars, each type-bar of the system having a plurality of types arranged one behind the other in the plane of the bar, a set of independent radially-arranged supports for said type-bars, and means for shifting said supports radially.
4. The combination of a platen, a set of type-bars each having a plurality of types, a set of independent radially-arranged supports to each of which a single type-bar is pivotally connected, and means for shifting said pivotal supports radially.
5. In a type-writing machine, the combination of a platen, a system of radially-arranged type-bars each having a plurality of radially-arranged types, supports for said type-bars that remain fixed during the various printing movements of the type-bars,

and means for changing the fixed positions of said supports to change the paths of the types without changing the radial plane in which any type-bar of the system works.

6. In a type-writing machine, the combination of a platen, a system of radially-arranged type-bars, each type-bar of the system having a plurality of types arranged one behind the other in the plane of movement of the bar which carries the types, and radially-operating shifting means that remain fixed in any position to which they are shifted for changing the paths of said types so as to shift from one case to another.

7. In a type-writing machine, the combination of a platen, a system of radially-arranged type-bars, each type-bar of the system having a plurality of types, the types on each bar being arranged in the plane of movement of the bar which carries them, and means for simultaneously changing the paths of all of said types in said planes, said moving means remaining fixed during the printing strokes of said bars.

8. In a type-writing machine, the combination of a platen, a set of radially-arranged type-bars each having a plurality of types, and means for effecting a simultaneous radial shift of all of said type-bars, each type-bar shifting in the same radial plane that it moves in during its printing operation.

9. In a type-writing machine, the combination of a platen, a system of radially-arranged type-bars, each type-bar of the system having a plurality of types arranged one behind the other and in the plane of the bar, a series of radially-arranged pivoted supports for said type-bars, said supports remaining fixed during all of the printing movements of said bars, and means for changing from one case to another by shifting simultaneously all of said radially-arranged supports.

10. In a type-writing machine, the combination of a platen, a series of radially-arranged type-bars each having a plurality of radially-arranged types, a set of pivoted supports, one for each of said type-bars and which remain fixed during all of the printing movements of said bars, and means for simultaneously shifting all of said supports radially.

11. In a type-writing machine, the combination of a platen, a system of radially-arranged type-bars, each type-bar of the system having a plurality of types arranged in the same radial plane as its bar, a set of radially-arranged pivoted supports to which said type-bars are pivotally connected and which remain fixed during all of the printing movements of said bars, a shifting device common to all of said radially-arranged supports, and means for moving said shifting device and causing simultaneous radial movements of all of said supports.

12. In a type-writing machine, the combination of a platen, a system of radially-arranged type-bars, each type-bar of the system having a plurality of types arranged in the same radial plane as its bar, a set of radially-arranged pivoted supports to which said type-bars are pivotally connected and which remain fixed during all of the printing movements of said bars, a shifting device common to all of said radially-arranged supports, and means for moving said shifting device and causing simultaneous radial movements of all of said supports.

nation of a platen, type-carriers, each type-carrier having a plurality of types thereon, and shifting means for changing the paths of the type-carriers, the shifting movements for the different carriers being effected simultaneously while the carriers are in the normal or non-printing positions and without moving the type-carriers.

13. In a type-writing machine, the combination of a type-bar having a plurality of types, the type-bar swinging on a plurality of centers, a guide-link pivoted to said type-bar and to a fixed portion of the machine, a key-actuated driver, and shifting means associated with said driver for changing the path of movement of the bar in the same plane in which the bar operates to print, so as to bring any one of the various types to the printing-point.

14. In a type-writing machine, the combination of a type-bar having a plurality of types arranged in the plane of the body of the bar, a driver for said type-bar, a guide-link pivoted to said type-bar and to a fixed portion of the machine, and means for changing the path of movement of said driver without changing the radial plane of its movement to bring any desired type to the printing-point.

15. In a type-writing machine, the combination of radially-arranged type-bars, each having a plurality of types thereon, a plurality of radially-arranged drivers for said type-bars, and means for shifting the case position of the said type-bars in different radial planes by changing the positions of the supports for the drivers.

16. In a type-writing machine, the combination of radially-arranged type-bars, each having a plurality of types thereon, a plurality of radially-arranged pivoted drivers for said type-bars, and means connected directly to the drivers for shifting the pivots thereof in different radial planes.

17. In a type-writing machine, the combination of radially-arranged type-bars, each having a plurality of types thereon, a plurality of radially-arranged pivoted key-actuated drivers for said type-bars, and means connected to the drivers for shifting the pivots thereof in different radial planes corresponding to the planes in which the type-bars move in the printing operations.

18. In a type-writing machine, the combination of radially-arranged type-bars, each of which has a plurality of types thereon, radially-arranged guide-links, one of which is pivoted to each type-bar, radially-arranged pivoted key-actuated drivers, one of which is pivotally connected to each type-bar, and means for shifting the pivots of said drivers in different radial planes.

19. In a type-writing machine, the combination of radially-arranged type-bars, each of which has a plurality of types thereon, radially-arranged guide-links one of which is

pivoted to each type-bar, radially-arranged pivoted drivers, one of which is pivotally connected to each type-bar, and means for shifting the pivots of said drivers in different radial planes corresponding to the radial planes in which the type-bars and drivers move in the printing operations and for maintaining said pivots or pivotal centers fixed during all of the printing operations.

20. In a type-writing machine, the combination of radially-arranged jointed type-bars, each of which has a plurality of types thereon, an inking-pad with which said types are normally in contact, and shifting means for changing the relative positions of members of said jointed bars while they are in the normal positions in order to change the paths of said type-bars without changing the radial planes in which they work.

21. In a type-writing machine, the combination of radially-arranged type-bars, each of which has a plurality of types thereon, an inking-pad with which said types are normally in contact, and means for simultaneously shifting all of the type-bars in different radial planes corresponding to the planes in which said type-bars move in the printing operations.

22. In a type-writing machine, the combination with radially-arranged "Yost" type-bars and key-actuated drivers therefor, of a plurality of types on each of said bars, and means for simultaneously shifting the parts of all of said type-bars in different radial planes so as to change the case or printing positions of the type-bars.

23. In a type-writing machine, the combination with radially-arranged "Yost" type-bars and key-actuated drivers therefor, of a plurality of types on each of said bars, and means for shifting the fulcrums of the drivers in different radial planes which correspond to the planes of movement of the type-bars and drivers in the printing operations so as to change the case or printing positions of the type-bars.

24. In a type-writing machine, the combination of radially-arranged jointed type-bars, each having a plurality of types thereon, an inking-pad on which said types normally rest, and means for shifting said type-bars independently of the inking-pad and in different radial planes when the parts are in the normal positions.

25. In a type-writing machine, the combination of radially-arranged jointed type-bars, each having a plurality of types thereon, a fixed inking-pad on which said types normally rest, and means for simultaneously shifting all of said type-bars independently of the inking-pad and in different radial planes which correspond to the planes in which said type-bars move in the printing operations.

26. In a type-writing machine, the combination

nation of radially-arranged jointed type-bars, each having a plurality of types thereon, radially-arranged key-actuated drivers, one for each of said bars, radially-arranged pivoted supports, one for each driver, and means for simultaneously shifting said supports in different radial planes.

27. In a type-writing machine, the combination of radially-arranged jointed type-bars, each having a plurality of types thereon, radially-arranged drivers, one for each of said bars, radially-arranged pivoted supports, one for each driver, and means for shifting said supports in different radial planes that correspond to the planes in which the type-bars move during the printing operations.

28. In a type-writing machine, the combination of radially-arranged jointed type-bars, each having a plurality of types thereon, radially-arranged pivoted drivers, one for each of said bars, finger-keys for actuating said drivers, radially-arranged pivoted supports, each of which has a driver pivoted thereto, and hand-operated means for shifting said supports around their pivots in different radial planes that correspond to the planes in which the type-bars move during the printing operations to effect a change in the case or printing position of the type-bars.

29. In a type-writing machine, the combination of radially-arranged bell-crank levers, radially-arranged jointed type-bars, each having a plurality of types thereon, radially-arranged drivers, one of which is connected to each of said bell-crank levers and to a type-bar, and means for simultaneously shifting all of said bell-crank levers in different radial planes to change the case or printing positions of the type-bars.

30. In a type-writing machine, the combination of a type-bar having a plurality of types, the type-bar swinging on a plurality of centers, a guide-link pivoted to said type-bar and to a fixed portion of the machine, and means for changing the path of movement of the bar to bring any one of the various types to the printing-point.

31. In a type-writing machine, the combination of a type-bar having a plurality of types thereon, a driver for said type-bar, a guide-link pivoted to said type-bar and to a fixed portion of the machine, and means for changing the path of movement of said driver to bring any desired type to the printing-point.

32. In a type-writing machine, the combination of a type-bar having a plurality of types thereon, a driver for said type-bar, and means connected directly to the driver for shifting the pivotal center thereof to bring any desired type to the printing-point.

33. In a type-writing machine, the combination of type-bars, each having a plurality of types, a driver for each bar, and means

connected directly to the drivers for simultaneously shifting the pivotal centers of all of said drivers to change the printing positions of the bars.

34. In a type-writing machine, the combination of a type-bar having a plurality of types thereon, a link pivoted to said type-bar and to a fixed portion of the machine, a pivoted key-actuated driver pivotally connected to the type-bar, and means for shifting the pivotal center of said driver to change the printing position of the type-bar.

35. In a type-writing machine, the combination with a Yost type-bar and its driver, of two types on said bar, and pivoted means directly connected to the driver for shifting it to change the printing position of the type-bar.

36. In a type-writing machine, the combination of a jointed type-bar having a plurality of types on a bar, a fixed center on which a portion of said bar turns when printing either upper or lower case characters, a fixed inking-pad with which said types are normally in contact, and means for shifting said fixed center so as to change the printing or case position of the bar without displacing the types from the inking-pad.

37. In a type-writing machine, the combination of a type-bar having a plurality of types on a bar, a driver therefor, a fixed inking-pad with which said types are normally in contact, and means directly connected to the driver for shifting it so as to change the printing or case position of the type-bar without displacing it from the inking-pad.

38. In a front-strike type-writing machine, the combination of a jointed type-bar with a plurality of types thereon, an inking-pad on which said types normally rest, and means for shifting said bar independently of the inking-pad while the parts are in the normal positions so as to change the relation of the parts and change the path of movement of the bar, to bring any type on the bar to the printing position.

39. In a type-writing machine, the combination of a jointed type-bar having a plurality of types thereon, a driver therefor, a pivoted support pivoted directly to said driver, and hand-operated means for moving said support around its pivot to shift the printing position of the bar.

40. In a type-writing machine, the combination of jointed type-bars each having a plurality of types thereon, key-actuated pivoted drivers therefor, a pivoted support for each of said drivers and a shift-key for moving said supports around their pivots to shift the printing position of the bars.

41. In a front-strike type-writing machine, the combination of jointed segmentally-arranged type-bars, each having a plurality of types thereon, segmentally-arranged drivers, one for each type-bar, segmentally-arranged

pivoted supporting-arms to each of which a driver is pivoted, and means for simultaneously shifting all of said supporting-arms to change the printing position of the bars.

42. In a front-strike type-writing machine, the combination of segmentally-arranged bell-crank levers pivoted to a fixed portion of the machine, jointed type-bars, each having a plurality of types thereon, a key-actuated driver connected to each of said segmentally-arranged bell-crank lever and to a type-bar, and means for simultaneously shifting all of said bell-crank levers on their pivots to change the printing position of the type-bars.

43. In a type-writing machine, the combination of a series of radially-arranged type-carriers having each a plurality of types, a series of radially-arranged levers pivotally connected at one set of their ends to said type-carriers, and a shifter plate or bar connected to the other set of ends of said levers for simultaneously vibrating all of said levers and maintaining said levers fixed during the printing movements of the bars whether for upper or lower case writing.

44. In a type-writing machine, the combination of a series of radially-arranged type-bars each having a plurality of types, a series of radially-arranged case-shifting levers, one for each type-bar and to each of which a type-bar is operatively connected, said shifting-levers remaining fixed in either shifted position thereof during the printing movements of the type-bars, and means for shifting said levers so as to move the pivotal points of connection of said type-bars and enable the type-bars to print in a different case.

45. In a type-writing machine, the combination of a series of radially-arranged type-bars each having a plurality of types, a series of radially-arranged case-shifting bell-cranks, one for each of said type-bars to which said series of type-bars are pivotally connected, a shifter-plate also connected to said series of bell-cranks for moving them on their pivots, and means for moving said shifter-plate, so as to change the pivotal positions of said type-bars.

46. In a type-writing machine, the combination of a platen, segmentally-arranged type-bars, segmentally-arranged drivers, key-actuated means for operating said drivers, supports for said drivers, said supports being pivoted to a fixed portion of the machine, a shifting segment which coöperates with all of said supports and key-actuated means for shifting said shifting segment.

47. In a type-writing machine, the combination of a platen, segmentally-arranged type-bars that are pivoted to a fixed portion of the machine, key-actuated means for operating said type-bars, a shifting segment which coöperates with said type-bars to shift

the printing position thereof, and key-actuated means for shifting said segment.

48. In a type-writing machine, the combination of a platen, type-bars pivoted to a fixed portion of the machine, key-actuated means for operating said type-bars, a shifting segment which coöperates with the type-bars to shift the printing position thereof, parallel links upon which said shifting segment is mounted and key-actuated means for moving said segment on said links.

49. In a front-strike type-writing machine, the combination of a platen, segmentally-arranged type-bars pivoted to a fixed portion of the machine, key-actuated means for operating said type-bars, a shifting segment which coöperates with the type-bars to shift the printing position thereof, parallel links upon which said shifting segment is mounted and adapted to move in substantially a horizontal plane and key-actuated means for moving said segment on said links.

50. In a front-strike type-writing machine, the combination of a platen, segmentally-arranged jointed type-bars pivoted to a fixed portion of the machine, key-actuated drivers for said type-bars, separate supports for each of said drivers, a shifting segment which is grooved in its edge to receive said driver-supports and means for shifting said segment to change the printing positions of the type-bars.

51. In a front-strike type-writing machine, the combination of a platen, segmentally-arranged jointed type-bars pivoted to a fixed portion of the machine, key-actuated drivers for said type-bars, which drivers are pivoted to a fixed portion of the machine, a separate support for each driver, which supports are pivoted to a fixed portion of the machine, a shifting segment which engages said supports, parallel links upon which said segment is adapted to move, and key-actuated means for shifting said segment to change the printing position of the type-bars.

52. In a type-writing machine, the combination of a platen, segmentally-arranged type-bars, segmentally-arranged guide-links pivoted to said type-bars and to a fixed portion of the machine, segmentally-arranged drivers pivoted to a fixed portion of the machine, segmentally-arranged key-actuated bell-cranks operatively connected to said drivers, segmentally-arranged supports for said drivers which supports are pivoted to a fixed portion of the machine, and a key-actuated segment which coöperates with said pivoted supports to shift the printing position of the type-bars.

53. In a type-writing machine, the combination of a platen, segmentally-arranged type-bars, segmentally-arranged guide-links pivoted to said type-bars and to a fixed portion of the machine, segmentally-arranged drivers pivoted to a fixed portion of the machine,

chine, segmentally-arranged bell-cranks and draw-links connected to said drivers, key-levers, draw-links between said bell-cranks and key-levers, segmentally-arranged supports for said drivers, which supports are in the nature of bell-cranks that are pivoted to a fixed portion of the machine, a shifting segment which is connected to one arm of each of the bell-crank levers that affords a support for a driver to shift the printing position of the type-bars, parallel links upon which said segment is mounted, and key-actuated means for moving said segment.

54. In a type-writing machine, the combination of segmentally-arranged type-bars with a plurality of types on each bar, drivers for the type-bars, said drivers being carried by arms that are pivoted to a fixed portion of the machine, means for moving said arms on their pivotal centers to change the printing positions of the type-bars, key-levers and actuating-levers carried by and pivoted to a fixed portion of the machine and operatively connected to the key-levers and drivers.

55. In a type-writing machine, the combination of segmentally-arranged type-bars with a plurality of types on each bar, segmentally-arranged drivers for the type-bars, said drivers being carried by arms that are pivoted to a fixed portion of the machine, means for simultaneously moving all of said arms on their pivotal centers to change the printing positions of the type-bars, key-levers, and vertically-disposed and segmentally-arranged actuating-levers carried by and pivoted to a fixed portion of the machine and operatively connected to the key-levers and drivers.

56. In a type-writing machine, the combination of a vertically-disposed segmental hanger-support, hangers mounted upon opposite sides of said support fore and aft of the machine, and type-bar-actuating levers supported by said hangers.

57. In a type-writing machine, the combination of a vertically-disposed segmental hanger-support, hangers mounted upon opposite sides of said support fore and aft of the machine, means for adjusting said hangers, and type-bar-actuating bell-cranks supported by said hangers.

58. In a type-writing machine, the combination of a vertically-disposed segmental hanger-support, hangers, means for mounting said hangers upon opposite sides of said support fore and aft of the machine, the construction of the parts being such as to allow each of said hangers to turn on a horizontal axis, and each hanger to be retained in its adjusted position, and type-bar-actuating levers supported by said hangers.

59. In a type-writing machine, the combination of a vertically-disposed segmental hanger-support, hangers mounted upon opposite sides of said support fore and aft of the

machine, the hangers upon opposite sides of the support being staggered in their arrangement, and type-bar-actuating levers supported by said hangers.

60. In a type-writing machine, the combination of segmentally-arranged jointed upwardly and rearwardly striking type-bars, pivoted drivers which are pivoted directly to said type-bars, key-levers and vertically-disposed and segmentally-arranged actuating-levers carried by and pivoted to a fixed portion of the machine and operatively connected to the key-levers and drivers.

61. In a type-writing machine, the combination of segmentally-arranged type-bars, key-levers, a vertically-disposed segmental support, actuating-levers mounted upon said support at opposite sides thereof, and means for operatively connecting said actuating-levers to the type-bars and key-levers.

62. In a type-writing machine, the combination of segmentally-arranged type-bars, pivoted guide-links therefor, drivers for said type-bars, key-levers, a vertically-disposed segmental support, actuating bell-crank levers mounted upon opposite sides of said support and means for operatively connecting said bell-crank levers to the drivers and key-levers.

63. In a type-writing machine, the combination of segmentally-arranged type-bars, pivoted guide-links therefor, drivers for said type-bars, key-levers, a vertically-disposed segmental support, vertically-disposed actuating bell-crank levers mounted upon opposite sides of said support, means for operatively connecting said bell-crank levers to the key-levers forward of the segmental support, and means for operatively connecting said bell-crank levers to the drivers.

64. In a type-writing machine, the combination of key-levers, segmentally-arranged jointed type-bars, drivers that are pivoted to said type-bars, actuating draw-links connected to said drivers, each of said draw-links being straight throughout its length, vertically-disposed bell-crank levers pivoted to a fixed portion of the machine, and straight draw-links interposed and forming the connections between the key-levers and bell-crank levers.

65. In a type-writing machine, the combination of jointed type-bars, drivers pivoted to said type-bars, actuating-levers connected to said drivers, each driver having an elongated pivotal bearing of greater width than the arms of said levers, the arms of different levers being connected at different points in the width of the bearings thereof, and means for actuating said levers.

66. In a type-writing machine, the combination of jointed type-bars, drivers therefor, links connected to the drivers, actuating-levers connected to said links, each lever having an elongated pivotal bearing of greater

width than the arms of said levers, the arms of different levers being connected at different points in the width of the bearings thereof, means for supporting said levers at regular distances apart, and means for actuating said levers.

67. In a type-writing machine, the combination of a platen, type-carriers, each of which has a plurality of types thereon, and a type-guide at the printing-point, the parts being constructed and arranged so that when one type on a carrier is at the printing-point and is within the guide the other type on said carrier will be outside thereof.

68. In a type-writing machine, the combination of a platen, type-carriers, each of which has a plurality of types thereon, and a type-guide at the printing-point, the walls of said type-guide being adapted to extend into the space between the types on each carrier.

69. In a type-writing machine, the combination of a platen, type-carriers, each of which has a plurality of types thereon, a type-guide at the printing-point, the walls of which guide are adapted to extend into the space between the types on each carrier and a curved support for said guide which support is out of the path of the type outside the guide when another type on the bar is within the guide.

70. In a type-writing machine, the combination of a platen, type-carriers, each of which has a plurality of types thereon, and a type-guide at the printing-point which is adapted to be straddled by the type on each carrier, and means for supporting said guide from the rear portion thereof so that the support for the guide will not interfere with a type on a carrier when another type thereon is at the printing-point.

71. In a type-writing machine, the combination of a platen, type-carriers, each of which has a plurality of types thereon, and a substantially circular type-guide at the printing-point, the walls of which are adapted to be straddled by the types on each carrier.

72. In a type-writing machine, the combination of upwardly and rearwardly swinging

type-carriers, and an upright type-guide having internal guiding-faces which cooperate with each type-body on all sides thereof, and a cut-away portion at the upper left-hand corner thereof for exposing the last-written character.

73. In a type-writing machine, the combination of type-carriers, each having a plurality of types thereon, an upright type-guide which has an internal guiding-opening therein adapted to receive one type on a type-bar while the other type or other types remain outside the guide, said guide being rectangular in cross-section, and a cut-away portion at one corner of the guide for exposing the last-written character.

74. In a type-writing machine, the combination of a series of upwardly and rearwardly swinging type-carriers, and an upright type-guide having four internal inclined guiding-faces which cooperate with corresponding faces on each type-body and a cut-away portion at the upper left-hand corner of said guide for exposing the last-written character.

75. In a type-writing machine, the combination of a platen, a type-carrier having a plurality of type-holders thereon, said type-holders being freely movable independently of the type-carrier, an inking-pad on which the types on said holders normally rest and means for shifting the printing position of said type-carrier to bring any of the types to the printing-point.

76. In a type-writing machine, the combination of a platen, a series of type-bars each having a plurality of types thereon, means for shifting said type-bars to change the case position thereof, and a type-guide adjacent to the printing-point and which cooperates with any type on a bar and guides it on all sides.

Signed in the borough of Manhattan, city of New York, in the county of New York and State of New York, this 14th day of January, A. D. 1902.

CHARLES WELLINGTON WALKER.

Witnesses:

K. V. DONOVAN,
E. M. WELLS.