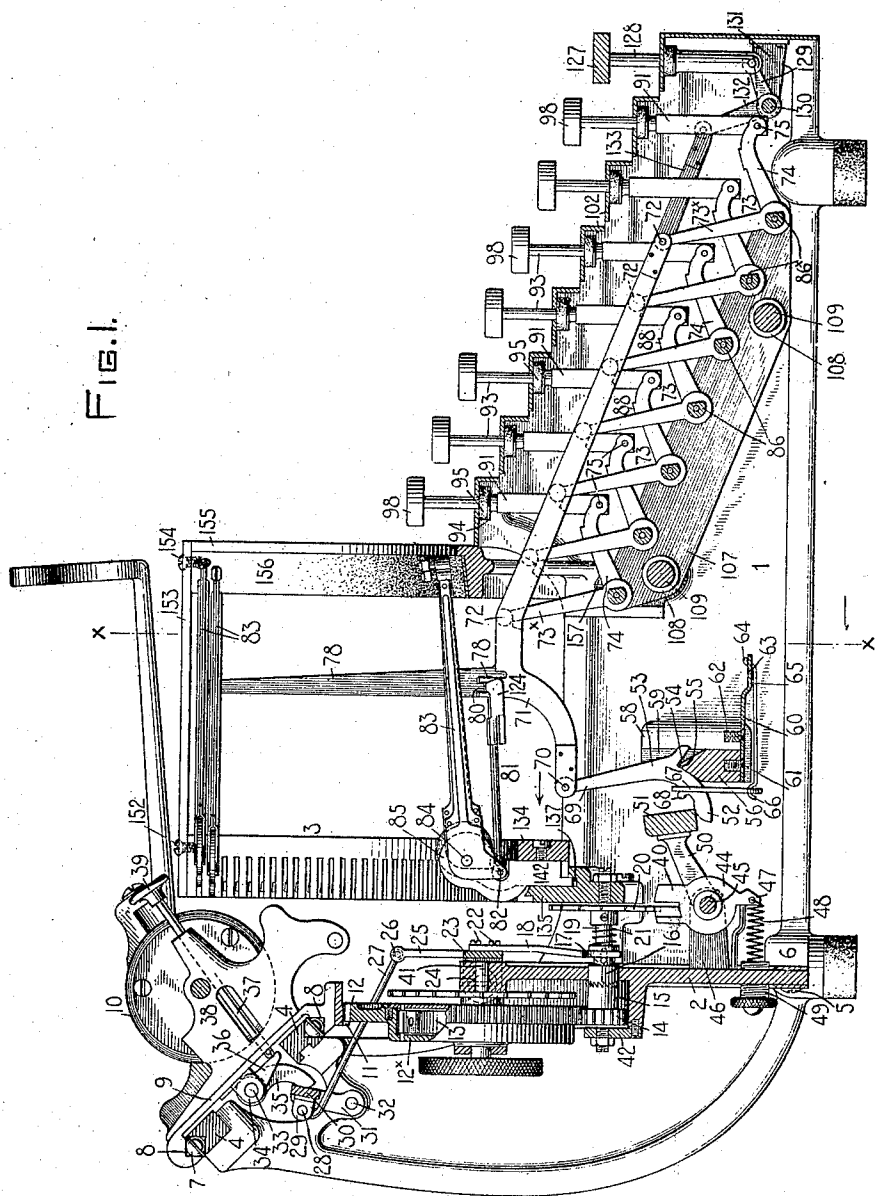


A. T. BROWN.
TYPE WRITING MACHINE.
APPLICATION FILED OCT. 16, 1902.

5 SHEETS—SHEET 1.



K. V. Donovan.
Charles Smith

Alexander T. Brown

by James Felber
HIS ATTORNEY

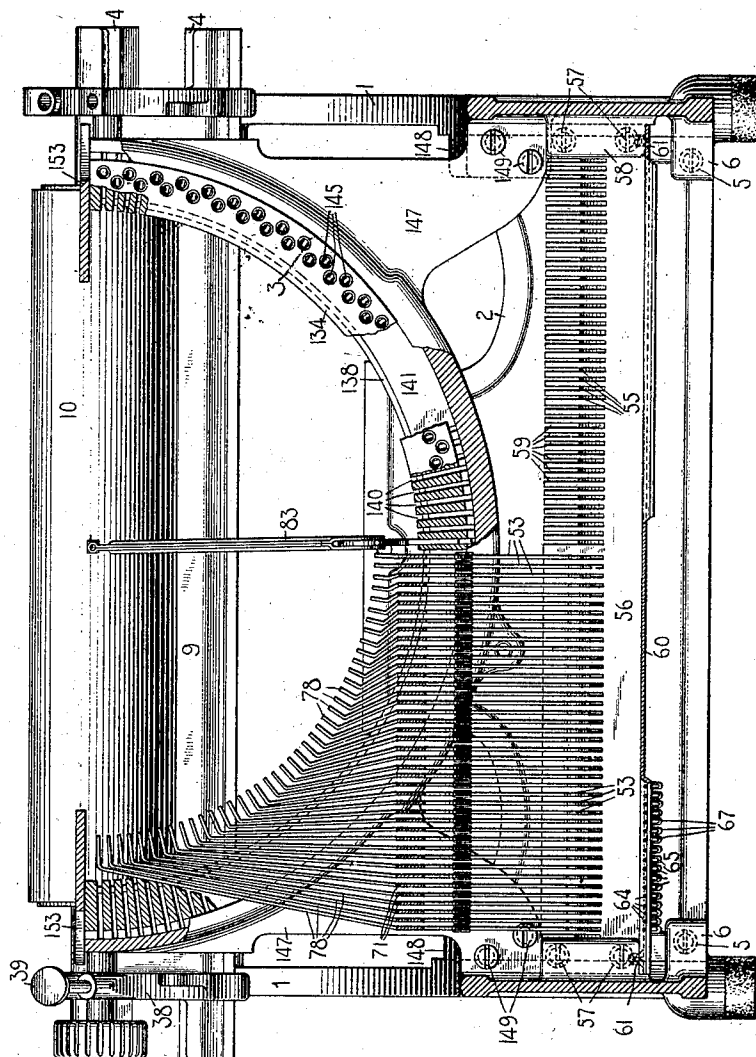
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1,000,986.

Patented Aug. 22, 1911.

6 SHEETS—SHEET 2.

Fig. 2.



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5 SHEETS—SHEET 3.

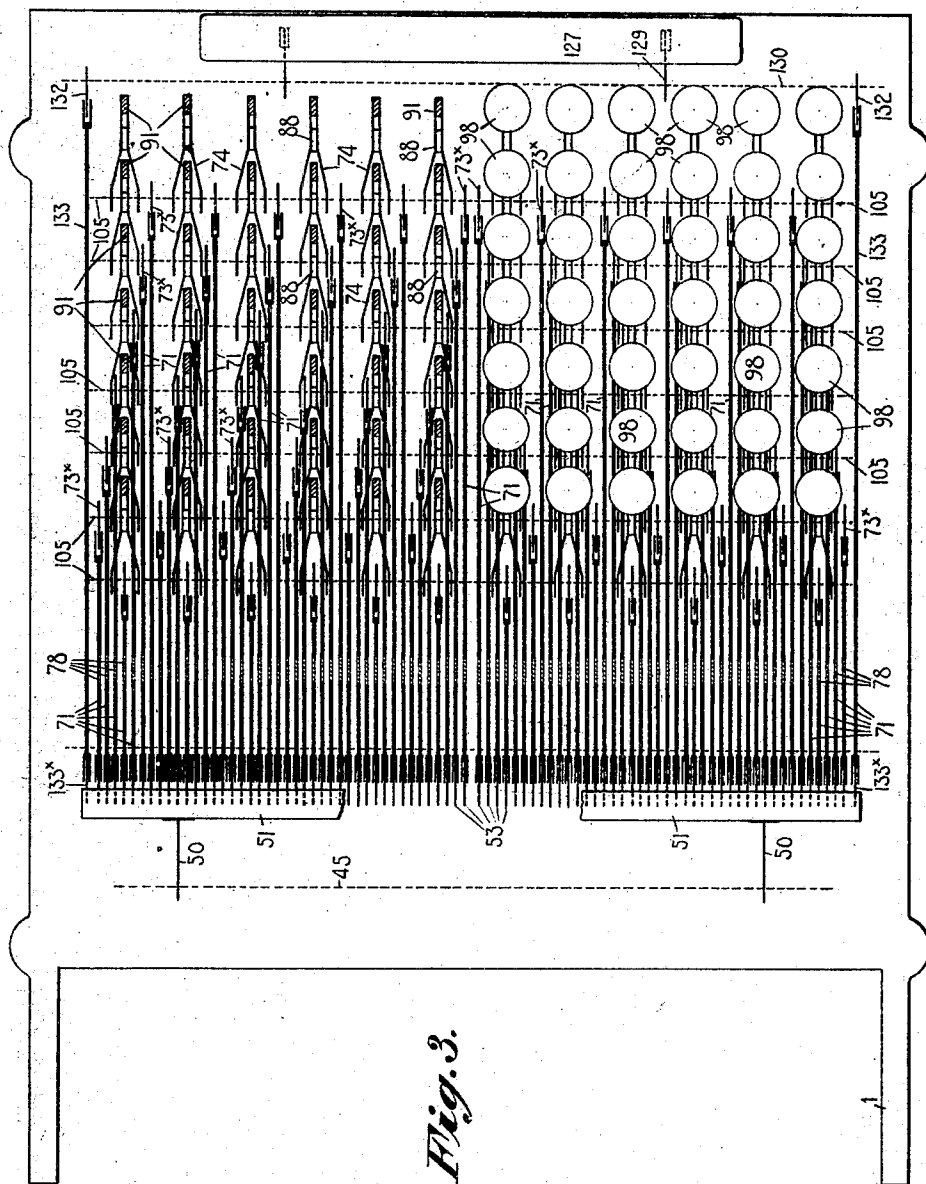


Fig. 3.

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5 SHEETS-SHEET 4.



Fig. 6.

Fig. 4.

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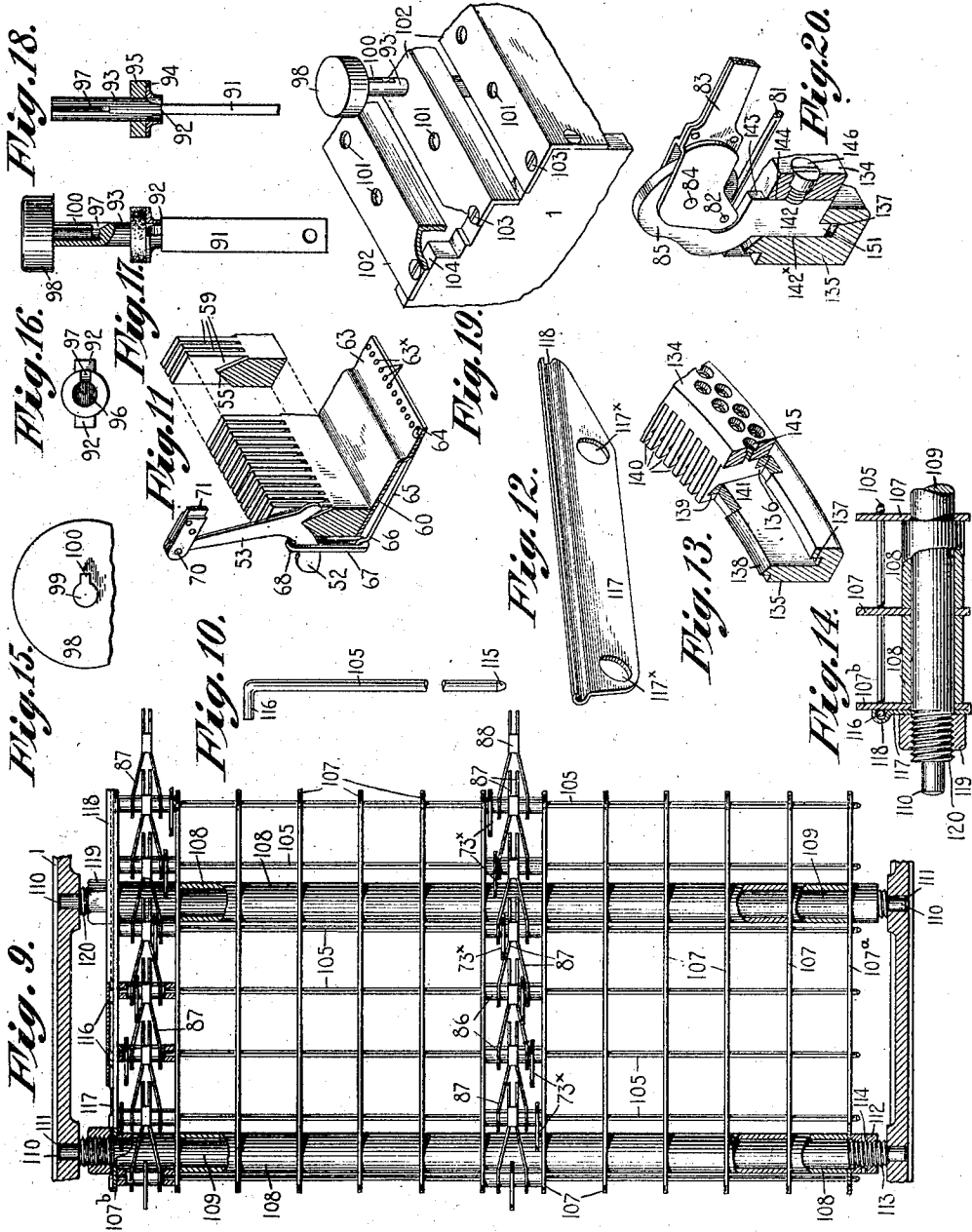
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A. T. BROWN.
TYPE WRITING MACHINE.
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1,000,986.

Patented Aug. 22, 1911

6 SHEETS—SHEET 6.



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UNITED STATES PATENT OFFICE.

ALEXANDER T. BROWN, OF SYRACUSE, NEW YORK.

TYPE-WRITING MACHINE.

1,000,986.

Specification of Letters Patent. Patented Aug. 22, 1911.

Application filed October 16, 1902. Serial No. 127,536.

To all whom it may concern:

Be it known that I, ALEXANDER T. BROWN, citizen of the United States, and resident of Syracuse, in the county of Onondaga and State of New York, have invented certain new and useful Improvements in Type-Writing Machines, of which the following is a specification.

My invention relates to typewriting machines and more particularly to the type actions thereof.

One of the objects of my invention is to provide an efficient, "visible" writing machine wherein about eighty-four characters may be employed with a separate type on each type bar.

Another object of the invention is to provide a machine of the character specified wherein the parts are so assembled and related that they may be contained in a machine of a standard size without unduly crowding the parts or detracting from the efficiency of the machine and wherein the type actions are devoid of torsional strain.

A further object of my invention is to provide an efficient typewriting machine wherein the parts may be readily and accurately assembled and wherein certain of the parts can be assembled before they are placed in the machine, thus facilitating the manufacture and reducing the cost of making the machine.

A still further object of my invention is to provide an efficient typewriting machine wherein the leverage and extent of "dip" of the various finger keys is uniform throughout the keyboard.

To these and other ends which will hereinafter appear my invention consists in the novel features of construction, arrangements of parts and combinations of elements to be hereinafter fully described and particularly pointed out in the appended claims.

In the accompanying drawings, wherein like reference characters designate corresponding parts in the various views, Figure 1 is a vertical front to rear sectional view of one form of typewriting machine embodying my invention. Fig. 2 is a transverse vertical sectional view of the same, the section being taken on the line *x x* of Fig. 1. Fig. 3 is a diagrammatic plan view of the keyboard and the parts connected with the finger keys, certain of the parts being in section. Fig. 4 is a vertical front to rear sectional view of the machine with

parts omitted. Fig. 5 is an enlarged detail perspective view showing a finger key and certain of the actuating parts connected therewith, together with a portion of the auxiliary frame in which they are mounted. Fig. 6 is an enlarged detail side view, with parts broken away, of the connection between an upright arm of a connecting link and a horizontally disposed link which connects with a type bar. Fig. 7 is a detail fragmentary perspective view of the same. Fig. 8 is a fragmentary vertical sectional view of two adjacent bell crank levers, the view showing the uppermost bell crank in the actuated position. Fig. 9 is an enlarged detail plan view of the auxiliary frame and certain of the parts mounted therein. Fig. 10 is an enlarged detail side view of one of the pivot rods. Fig. 11 is a detail perspective view of the support for the rear set of bell cranks, one of said bell cranks being shown in place. Fig. 12 is a detail perspective view of the securing plate for the pivot rods of the forward set of bell crank levers. Fig. 13 is a fragmentary perspective view of the type bar segment. Fig. 14 is a fragmentary front view, with parts broken away, of the auxiliary frame. Fig. 15 is an enlarged fragmentary bottom view of a key-head. Fig. 16 is a top view of a key-stem with the abutment removed. Fig. 17 is a side view with parts broken away of a key-head and stem. Fig. 18 is a side view of the key-stem with the abutment shown in section, the view being taken at right angles to the position shown at Fig. 17. Fig. 19 is a perspective view of the key-stem guide-plates with one of the key-stems shown in position. Fig. 20 is a fragmentary perspective view of a type bar segment with the hanger and a portion of the type bar shown in place.

In the various views, parts have been omitted or broken away to better illustrate other features of the construction.

The frame of the machine comprises two end or side plates 1 which are united by a rear plate 2, a vertically disposed segment 3, cross rails 4 and various other parts which will be hereinafter described. The rear plate 2 constitutes a support for various parts of the structure and is secured in place by headed screws 5, the stems of which pass therethrough and into threaded openings in the lugs 6 which project inwardly from the side plates. The rails 4 are grooved on

their outer faces for the reception of anti-friction balls 7 which are received within companion grooves 8 in a carriage 9 which supports a rotatable platen 10 and carries a rack 11 that is maintained in constant mesh with the gear wheel 12. This gear wheel is provided with a central recess or chamber 12* in which a driving spring 13 is contained and the tension of which is exerted upon the gear wheel to rotate it and thus transmit a feed movement to the carriage as it will hereinafter more clearly appear. Meshing with the gear wheel 12 is a pinion 14 that carries a clutch-section 15, which in turn coöperates with a second clutch section 16 that has a peripheral groove 17 therein that is engaged by the forked end of a depending arm 18. This clutch section 16 is splined to the shaft 19 which has an escapement wheel 20 rigidly secured thereto. An expansion spring 21 surrounds the shaft 19, and is interposed between the head of the clutch section 16 and the hub of the escapement wheel so that the tension of the spring normally maintains the clutch section 16 in engagement with its coöperating clutch member 15. The depending arm 18 is secured at 22 to a yoke-like portion or frame 23 which is pivoted transversely of the machine at 24, (as shown in dotted lines in Fig. 1), in order that the arm 18 may vibrate fore and aft of the machine. This yoke-like portion has secured thereto an arm 25 which is pivoted at 26 to a link 27 connected at its rear end by a pivot 28 to ears 29 that project rearwardly from a bar 30 that extends transversely from side to side of the machine. This bar is likewise provided with depending arms 31 at the ends thereof that are pivoted at 32 to the side plates of the machine. A rock shaft 33 is mounted in bearings 34 depending from the carriage and the rock shaft carries a depending crank arm 35 that is adapted to bear on the forward face of the bar 30. A second crank arm 36 extends from the rock shaft into the path of a plunger rod 37 that moves longitudinally in suitable bearings in an end plate 38 of the carriage and is provided at its forward or upper end with a button or head 39.

From the foregoing description, it will be understood that a depression of the button 39 will cause the rock shaft 33 to be vibrated, thus moving the bar 30 toward the rear of the machine, irrespective of the position of the carriage. The rearward movement of the bar 30 will cause the yoke or frame 23 to be vibrated, thus moving the depending arm 18 toward the front of the machine, thereby disconnecting the clutch section 16 from its coöperating section 15 which results in a disconnection of the carriage from the escapement wheel 20 and the carriage is free to be moved in either direction. When, how-

ever, the clutch sections are in engagement, as shown in Fig. 1, the carriage will receive a step-by-step movement in the direction of its feed during the actuation of the keys, through the vibration of the feed dogs 40.

The spindle 41 of the combined driving gear and spring drum 12 12* is supported upon the rear plate 2 of the machine, as is likewise the frame or yoke 23. The shaft 19 is supported at one end by a bracket arm or plate 42 that receives its support from the rear plate, whereas the opposite end of the shaft is supported by the segment 3. The feed dogs 40 hereinbefore referred to, are rigidly secured to the dog carrier 44 and are beveled in opposite directions to coöperate with the teeth of the feed or escapement wheel 20. The feed dog carrier is secured to a rock shaft 45 which turns in bearings in forwardly extending bracket arms 46 that project from the rear plate 2. The dog carrier is likewise provided with a depending portion 47 to which one end of a spring 48 is connected, the opposite end of the spring being secured to a screw 49 that is received within a threaded opening in the rear plate 2 and by means of which the tension upon the dog carrier may be varied. The rock shaft 45 is provided with forwardly extending arms 50 that carry a universal bar 51 and this universal bar is acted upon by the rearwardly extending arms 52 of any of the bell crank levers 53. These bell crank levers are each provided with a bifurcated portion 54 that straddles a knife edge or scale bearing 55 of a bearing piece 56, which latter is secured by screws 57 (see Fig. 2) to lugs 58, projecting inwardly from the side plates of the machine. Each of the bell crank levers 53 is seated in a kerfed or slotted portion 59 of the bearing and is guided therein during its vibration. To the lower edge of the bearing 56 is secured a plate 60 by means of screws 61 and 62 that extend through the plate and into threaded openings in the bearing and in the lugs 58 respectively. This plate is bent at its forward portion so as to form a depending projection or bearing portion 63 which has a series of openings 63* near the forward edge thereof (see Fig. 11). Each of these openings is adapted to receive the bent end 64 of a returning wire or leaf spring 65, and the opposite end of each spring is provided with a hook-like portion 66 that is received within the lower end of a strap or link 67. The upper end of each strap or link 67 passes over the arm 52 of a bell crank 53 and is seated over a lug 68 that projects therefrom. It will thus be understood that the tension of each wire spring 65 is exerted to depress the arm 52 of its bell crank lever, thus tending to move the upwardly extending arm 69 thereof in the direction of the arrow adjacent thereto in Fig. 1, and at the

same time each spring tends to maintain its bell crank lever on the seat or bearing thereof. All of the bell crank levers 53 are of a uniform size and are mounted in the same transverse vertical plane and on fulcrums or pivotal centers that are in the same horizontal plane so that a forward movement of the upwardly extending arm of any bell crank lever will transmit motion to the universal bar 51, thus turning the rock shaft 45 and vibrating the feed dogs toward the rear of the machine. A return movement of the actuated bell crank lever to its initial position will permit the universal bar and feed dogs to be restored to their initial positions through the spring 48 and a letter space feed movement of the carriage will be effected.

Each of the bell crank levers 53 is pivotally connected at its upper end 70 to a connecting or actuating link 71 that extends fore and aft of the machine and is pivoted at its forward end 72 to an upwardly extending arm 73* of a bell crank lever 73. The other crank arm 74 of each bell crank lever 73 is pivoted at 75 to a key-stem which is provided at its upper end with a finger-key or button. The various connecting links 71 therefore extend from the upwardly projecting arms of the forward set of bell cranks to the upwardly extending arms 69 of the rear set or supporting bell cranks, in parallel vertical planes and are all situated in a single inclined plane. The forward set of bell cranks are arranged at progressively greater heights from the front toward the rear of the machine and in different transverse rows fore and aft of the machine and it follows therefore that the connecting links 71 are of different lengths; all of those connecting with the same transverse row of bell cranks being of the same length. Each link 71 is provided with an upwardly extending arm 78 that has an opening 79 with a contracted outlet 80 and the opening receives a pivot of a substantially horizontally disposed link 81 pivoted at its rear end 82 to a type bar 83 that is pivoted at 84 to a hanger 85 secured in the segment 3 in a manner to be hereinafter described. The upwardly extending arms 78 on the connecting links 71 are all situated in a single vertical plane transverse of the machine and are of different lengths, those near the center of the system being the shortest and increasing in length as they approach the sides, as indicated in Figs. 1 and 2 of the drawings. Thus in Fig. 1 the link having the shortest arm 78 is one that connects with a type bar at or near the center of the segment, whereas the link having the longest upright arm 78 is one which connects with the type bar at one side of the segment. In other words, the upper ends of the links are arranged in an arc or segment that corre-

sponds substantially to the arc in which the pivotal centers of the type bars are situated and both of said arcs are in vertical parallel planes. From an examination of Fig. 2, it will be understood that the width of the series of links 71 at the body portions thereof, as they extend across the machine, is greater than the width of the series of segmentally arranged links 81 with which the links 71 connect. The upright arms 78 of the links 71 are therefore made converging or those near the sides of the system are bent inwardly in order to connect with their respective links 81 and so that the pull upon the links 81 will be in a direct plane fore and aft of the machine. It will be seen upon reference to Figs. 1 and 4 that the upright arms 69 and 73* of the bell cranks 53 and 73 respectively are parallel and move in parallelism during the actuation thereof so that the connecting links 71 move in substantially horizontally planes and a straight forward pull is exerted upon the links 81 to move the type bars to the printing position and this is true throughout the system and no torsional strain is exerted upon the parts whether the action be at the center or at either side of the machine.

From certain aspects of my invention the upright arms 69 and 73* of the bell cranks 53 and 73 respectively may be regarded in the nature of parallel links which move in parallelism fore and aft of the machine and which may be actuated in any suitable manner to transmit movement to the type bars.

Each of the bell cranks 73 is made up of an upwardly extending arm 73* that has an aperture at its hub-like portion which corresponds to the cross section of the bearing sleeve 86 on which it is adapted to be received and to be held fast against longitudinal movement on the sleeve by frictional contact. From an examination of Fig. 5, it will be observed that this bearing sleeve is flattened on one side thereof as indicated at 86* so that the crank arm 73* will be secured to turn with the sleeve. The lower crank arm 74 of the bell crank lever is made up of two converging side pieces 87 that are preferably struck up from a single piece of sheet metal and are united by a cross piece 88. The hub-like portions of these side pieces 87 are adapted to be forced upon the bearing sleeve 86 and are apertured to conform with the external shape of the flattened sleeve so that the crank arms and sleeve will turn together. The converging sides 87 extend upon opposite sides of a key-stem that is pivoted thereto at 75. Each key-stem is provided with a lower flattened portion 91 that forms a shoulder 92 where it joins the integral cylindrical portion 93 thereof. A metal sleeve or washer 94 has a central perforation by which it is received upon the cylindrical portion of the stem and

rests upon or is supported by a shoulder 92 thereof. This sleeve or washer 94 is sheathed at its upper face with a buffer of felt or like material, as indicated at 95.

Each key-stem is provided with an opening 96 in the upper end thereof which communicates with a slot 97 in the side wall of the stem. A key-head 98 has a depending projection or pintle 99 that has a feather or flange 100 extending laterally therefrom and the construction of the key head and stem is such that the cylindrical portion of the pintle 99 is adapted to be received within the opening 96, whereas the flange or feather 100 is received within the slot 97 in the key-stem, thus maintaining the head properly positioned on the key-stem and preventing it from turning with relation thereto so that the character on the head may be maintained in proper position and yet the key heads may be removed at will. The cylindrical portions of the key stems are adapted to project through guiding openings 101 in the guide plates 102 which are secured by screws 103 to the step-like portions 104 of the side plates 1 of the machine. From an examination of Fig. 1, it will be seen that in the normal position of the parts, the buffers 95 for the key-stems bear against the bottom faces of the guide plates, thus constituting abutments on the key stems, whereas the guide plates constitute fixed abutments against which the buffers bear to limit the upward movement of the key stems. The various bearing sleeves 86 hereinbefore referred to, each has a central longitudinal opening therein for the reception of a horizontal pivot wire or rod 105 that projects through bearing openings 106 in a series of parallel supporting plates 107 which extend fore and aft of the machine and are situated in an inclined plane. The length of each bearing sleeve 86 is such that it will be contained between a pair of plates 107 and will be prevented from endwise movement on the pivot pin, thus preventing a movement of the bell crank, of which the sleeve constitutes a part, along the pivot rod 105. The parallel plates 107 are maintained spaced apart by sleeves 108 that surround and are supported by two transverse supporting rods 109 that extend from side to side of the machine. These rods terminate in pintles or bearing studs 110 that are received within openings 111 in the side plates 1 of the machine. One end of each of the rods 109 is provided with an internally threaded collar 112 which is received upon a threaded portion 113 of the rod. A pin 114 passes through transverse openings in the collar and in the rod to lock the sleeve against rotation and these sleeves 112 constitute abutments for the end plate 107^a of the so-called auxiliary frame. After the requisite number of parallel plates 107 are in place on the supporting rods 109 with the spacing sleeves interposed between the plates an end plate 107^b is placed in position and the various pivot wires 105 have their ends 115 projected through the bearing openings 106 in the parallel supporting plates 107, 107^a and 107^b and through the bearing sleeves 86 of the various sets of bell crank levers 73. After the bell crank levers have been mounted in place in the manner described, the angular ends 116 of the pivot wires will be brought adjacent to the end plate 107^b and when the ends are arranged in proper longitudinal alinement, the securing plate 117 (shown in detail in Fig. 12) may be placed in position with the bearing openings 117^a therein seated on the supporting rods 109 and so that the heads 116 of the various pivot wires are contained within the grooved portion 118 of the plate, thus preventing the withdrawal of the pivot wire. The nuts 119 may then be screwed upon the threaded portions 120 of the cross bars 109, thereby locking the various parallel plates 107, 107^a, 107^b and the locking or securing plate 117 together, thus forming the so-called auxiliary frame with the various bell crank levers 73 mounted in position thereon. The mounting of the bell crank levers 73 in the auxiliary frame in the manner described may be effected after each bell crank lever has been connected to its key-stem, connecting lever 71 and supporting bell crank 53, so that these parts, together with the auxiliary frame, may be mounted as an entirety in the machine frame. The bell cranks 53 may then be seated in their respective slots in the bearing 56 so as to fulcrum on the knife edges or scale bearings 55 and the springs 65 connected to the lever arms 52 by intermediate links 67.

From an examination of Figs. 7, 8, and 9, it will be seen that the disposition of the parts is such that the crank arm 74 of one bell crank lever is above that of an adjacent bell crank lever and works between the converging sides 87 of the latter. By these means I am enabled to economize space and to mount the forward bell cranks 73 and the key stems and heads in straight rows fore and aft of the machine and at the same time to provide a bell crank construction wherein the broad bearing of the sleeve 86 on its pivot rod affords means for connecting the upright arms 73^a of the various bell cranks to their sleeves at different points in the width thereof, as will be understood upon reference to Figs. 3 and 9 of the drawings, thus affording a parallel arrangement of the links 71 without interference. It will be seen that in the present instance the seven keys and key stems of each fore and aft row are arranged in a straight line fore and aft of the machine but that, nevertheless, the upright arms 73^a of each row are arranged at

seven different positions in the width of a single bearing sleeve 86 of the row so that the links 71 of each fore and aft row of keys may be connected to their actuating bell cranks at seven different points in the width thereof and yet be maintained in parallelism. This is an important feature of my present invention since it enables me to separate the type bars of adjacent keys and avoids the liability of conflict between adjacent type bars in the basket without changing the standard keyboard. Thus, for example, the keys for the letters "e" and "d" and "E" and "D" are usually arranged one above the other in the same fore and aft row and these letters are frequently used one after another. It is desirable therefore that the type bars for these letters be separated to avoid the liability of conflict when they are rapidly operated in succession. I am likewise, by this arrangement, enabled to provide an action where there is but little, if any, torsional strain on the bell crank levers by reason of the elongated widthwise bearing provided therefor and the disposition of the crank arms on the bearing sleeves. In fact, the strain exerted upon the parts of each action from the finger-key to the type bar may be said to be a direct one fore and aft of the machine, there being little if any torsional strain upon any of the parts, whether the action be at the center or at the sides of the system, thereby providing easy, rapid and efficient actions throughout the system. It will also be seen that all of the actuating parts of each action up to the type bar move fore and aft of the machine in a substantially vertical plane and that the planes in which the actuating parts of the different actions are situated are substantially parallel; that the links 71 and 81 are draw or pull links which receive the strain applied thereto by the keys in the direction of their lengths and that they could therefore, if necessity demanded, be made of very thin and light stock; that there is no crossing of the parts except the bell cranks 73 which does not interfere with the operation of mounting or of the removal of the parts nor detract from the efficiency of the machine but on the other hand adds to its efficiency. Furthermore each series of bell cranks 53 and 73, key stems, etc., are of a uniform size. By mounting the various bell crank levers 73 in the auxiliary frame in the manner specified and connecting the connecting links 71, bell cranks 53 and key-stems thereto, I am enabled to assemble these parts outside of the machine proper and afterward readily place them in the machine. This assemblage of the parts is facilitated by the construction of the links 81, each of which is made in the nature of a two-part link, as shown in Figs. 1, 4, 6 and 7, one member

of the link consisting of a rod 121 which is pivoted at one end 82 to the type bar and the opposite end of which is threaded at 122 where it is received within an internally threaded portion 123 of the other section. This internally threaded portion is struck up into a barrel-like or substantially cylindrical form from a single piece of sheet metal, with the edges 123* thereof brought together and terminating at its forward portion in two parallel side arms 124 that are spaced apart for the reception of the upper end of an arm 78 of a link 71. The side arms are united by a cross-piece 125 which is formed as an integral part of the side arms and has an integral portion 126 that is bent downwardly and back upon itself so as to constitute a smooth bearing surface by the presentation of a rounded, smooth, side-surface of the metal from which the piece is struck up for cooperation as a pivot with the bearing in the arm 78. From an examination of Fig. 6, it will be seen that the relation of this pivot or cross-piece 125—126 to the opening 79 and outlet 80 in the extension or upright arm 78 is such that in the normal disposition of the parts, the horizontal link 81 and connecting link 71 cannot become disconnected. When, however, the parts are turned to aline with each other (a position which they do not occupy during the operation of the machine), they may be quickly connected or disconnected. The threaded connection between the members 121 and 124 provides for an adjustment of the links to take up any lost motion that may exist between the parts of each action. In other words, each link 81 may be lengthened or shortened at will in order to take up any play that may exist between the parts intermediate the type bar and finger key.

It will be understood from an inspection of Fig. 1 that the tension of each spring 65 is exerted to force the buffer or abutment 95 on the cooperating key-stem against the cooperating guide plate or fixed abutment 102 so that the tendency of each spring 65 is to take up any lost motion or looseness that may exist between the parts intermediate the type bars and finger keys, and the machine in operation will be free from rattling at all times even if lost motion exists between the parts.

The space bar 127 is connected to key-stems 128 that are pivoted at their lower ends to crank arms 129 which project from a rock shaft 130 supported in bearing brackets 131. This rock shaft is provided with upwardly extending crank arms 132 which have connected links 133 pivoted to the upper ends thereof. These links 133 correspond in shape to the body portions of the links 71 and are pivoted at their rear ends to bell crank levers 133* (see Fig. 3), in the same manner as the links 71. These 130

bell crank levers 133* are the same in construction as the bell cranks 53 and bear on the lower side of the universal bar and at opposite ends thereof in the same manner as the arms 52 of the bell cranks 53 so that a depression of the space bar will bring about a forward movement of the links 133, thus moving the bell cranks 133* toward the front of the machine, thereby raising the universal bar and transmitting a feed movement to the carriage in the manner hereinbefore described.

The type bar segment 3 is made up of two sections 134 and 135, both of which are segmental in form and extend throughout the length of the segment. Upon reference to Fig. 13, it will be observed that the segmental section 134 is provided with a flange 136 on the lower edge thereof which extends throughout the length of the section and takes into a corresponding groove or channel 137 in the section 135. The section 135 is likewise provided with a beveled flange 138 that extends throughout its length on the upper side thereof and takes within a corresponding groove or channel 139 formed in the section 134 so that the two sections may interlock transversely and thus constitute practically a single segment. The section 134 is slotted radially of the printing point at 140, whereas the section 135 is plain or imperforate throughout its length and is provided with a plane face 141 that constitutes an abutment for one edge 142* of the stem 142 of each of the type bar hangers 85, whereas the opposite edge 143 of each hanger stem bears against the end wall 144 of one of the slots 140 in the section 134. Each slot 140 communicates with a threaded opening 145 which receives a set screw 146 that is adapted to bear at its inner end against the edge 143 of a hanger stem, thus maintaining it in position in its slot and at the same time exerting a pressure between the two sections of the segment which tends to maintain a rigid interlocking engagement between the parts. The two sections of the segment may, if desired, be further united by screws which pass transversely from one section to the other and tend to hold the two sections together. It will be observed that the construction of the segment is such that it may be with little difficulty readily mounted in place in the machine and that the hangers may be readily and accurately assembled in place in the segment. The rear section 135 of the segment is provided with lateral extensions 147 at each side thereof which extend to the side plates 1 of the machine and are adapted to be secured in place to lugs 148, which project inwardly from said side plates, by headed screws 149, the stems of which pass through openings in the extensions 147 and take in threaded openings in the lugs.

From an examination of Fig. 1, it will be seen that the stems 142 of the various hangers are alined transversely of the machine and are each provided with a depending lug 151 which is received within the channel or groove 137 in the section 135. It will likewise be seen that the bearing portions or heads of the various hangers are staggered or project to different extents fore and aft of the machine. That is to say, every other hanger of one series will have the pivotal centers for the type bars located in a single vertical plane that extends transversely of the machine, whereas the pivotal centers for the type bars of the other series of alternating hangers will be in a vertical plane that extends transversely of the machine and is parallel to the plane in which the pivots of the first mentioned series of type bars are mounted so that the forward ends of the type bars, all of which are of the same length, have their forward ends staggered alternately in order that the type on one bar will be clear of the types on the adjacent bars and a close assemblage of the type bars and hangers may therefore be provided. Furthermore, it will be seen that while the pivots of the type bars and the hanger heads are staggered fore and aft of the machine they are at the same or substantially the same distance from the printing center, for which reason type bars of a uniform length may be provided. It will be understood that the arrangement of the various hangers radially of the printing center permits of a radial adjustment of the hangers in their slots, whereas they are accurately positioned in the fore and aft arrangement thereof and the hangers of each set are interchangeable and no care need be exercised in the positioning of a particular hanger in a particular place in the segment so long as the hangers of one series properly alternate with those of the other series. This construction likewise provides means whereby any individual hanger may be readily removed with its type bar without disturbing the other hangers or type bars. The section 134 of the segment is provided at its upper ends with threaded openings for the reception of the stems of screws 152 by means of which the forwardly extending plates 153 that overlap the ends of both sections of the segment, are secured in place. The forward ends of these plates receive screws 154 that take within threaded openings in a segmental support 155 sheathed with a pad 156 in order to support the free ends of the various type bars in their normal positions. This segmental support constitutes a front plate for the machine and extends from side to side thereof and is united to the side plates by headed screws 157, the stems of which pass through the segment and into threaded openings in the side plates. Like

screws may pass through the side plates and into threaded openings in the supporting segment, thus not only maintaining the supporting segment in place but forming a rigid connection between the side plates at the forward portion of the machine. The plates 153 being rigidly secured in the manner described to the frame of the machine and to the type bar segment constitute additional means to prevent an upward displacement of the section 134 relatively to the section 135 and the interlocking engagement between the sections prevents their disconnection in any other manner.

From the foregoing description it will be understood that each of the links 71 is mounted on four parallel axes 70, 72, 55 and 105; that the axes 70 and 72 are movable axes, whereas the axes 55 and 105 are fixed axes; that the construction is such that the axes 70 and 72 move in directions more nearly horizontal than vertical; that each link 71 includes an upright portion 78 extending above the lowermost portion of the type bar segment, the center of which is in front of the platen and that the links 81 which connect the links 71 with the type bars are connected to the upright portions 78 of the links 71 at elevations progressively increasing from the middle to the sides of the system.

While many of the features of my invention are particularly available in a front strike or "visible" writing machine, I would have it understood that from certain aspects of the invention the different features thereof are not limited to a "visible" writing machine and that certain features of the invention may be used without others.

The paper carriage construction and mounting herein shown are claimed in my application Serial No. 305,053, filed March 9th, 1906. The staggered arrangement of the type bars is claimed broadly in another application filed by me on the 21st day of May 1901, and bearing Serial No. 61,206, the particular construction herein shown and described being claimed in the present application.

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

1. In a typewriting machine, the combination of printing instrumentalities, a machine frame in which said printing instrumentalities are mounted independently of their actuating means, key operated actuating means detachably connected to said printing instrumentalities, and an independent detachable frame in which actuating means for the printing instrumentalities are mounted.

2. In a typewriting machine, the combination of printing instrumentalities, a machine frame in which said printing instrumentalities

are mounted independently of their actuating means, key operated actuating means detachably connected to said printing instrumentalities, an independent frame in which actuating means for the printing instrumentalities are mounted, and means for removably securing the independent frame to the machine frame, so that the independent frame, together with the key operated actuating means, can be placed in or removed from the machine frame as a whole.

3. In a typewriting machine, the combination of printing instrumentalities, a machine frame in which said printing instrumentalities are mounted, key actuated bell cranks, finger keys connected therewith, an independent frame which is removably secured to the machine frame and in which said bell cranks and finger keys are mounted, and disconnectible intermediate connections between said bell cranks and printing instrumentalities.

4. In a typewriting machine, the combination of printing instrumentalities, a machine frame in which said printing instrumentalities are mounted, key actuated bell cranks which are arranged at progressively greater heights as they approach the rear of the machine, an independent frame in which said bell cranks are mounted, intermediate connections which disconnectibly connect the bell cranks to the printing instrumentalities, and means for removably securing the independent frame to the machine frame so that the independent frame and key actuated bell cranks may be placed in or removed from the machine frame as an entirety.

5. In a typewriting machine, the combination of printing instrumentalities, a machine frame in which said printing instrumentalities are mounted, key actuated bell cranks, key stems and actuating links connected to said bell cranks, an independent frame which is removably secured to the machine frame and in which said bell cranks and key stems are mounted, and disconnectible intermediate connections between said actuating links and printing instrumentalities.

6. In a typewriting machine, the combination of a machine frame, a type bar segment secured to the machine frame, type bars mounted on said segment, an auxiliary frame independent of and removable from the machine frame, a series of pivot rods which extend from side to side of said auxiliary frame, key actuated levers journaled upon said rods, and disconnectible connections between said levers and the type bars.

7. In a typewriting machine, the combination of a machine frame, a type bar segment, type bars mounted on said segment, an auxiliary frame independent of and removable from the machine frame, a series

of pivot rods which extend from side to side of said auxiliary frame and which are independently removable therefrom, key actuated bell crank levers journaled upon said rods and adapted to vibrate fore and aft of the machine, and intermediate link connections between said key actuated bell crank levers and the type bars.

8. In a typewriting machine, the combination of a machine frame, an auxiliary frame that is independent of the machine frame but is removably secured thereto, key actuated bell crank levers, pivot rods that extend across said auxiliary frame and upon which the bell cranks are pivoted, means which afford the removal of any one of said pivot rods without disturbing the others, type bars, and intermediate connections between said bell cranks and type bars.

9. In a typewriting machine, the combination of a machine frame, an auxiliary frame that is independent of the machine frame but is removably secured thereto and which comprises parallel plates that are spaced apart, key actuated bell crank levers, pivot rods that are received in bearings in the parallel plates of said auxiliary frame and upon which the bell cranks are pivoted, means which afford the removal of said pivot rods, type bars, and intermediate connections between said bell cranks and type bars.

10. In a typewriting machine, the combination of a machine frame, an auxiliary frame that is independent of the machine frame but is removably secured thereto, said auxiliary frame comprising parallel plates that are secured together, pivot rods supported by said plates, key actuated type bar operating instrumentalities contained between said plates and vibrating on said pivot rods, and type bars operatively connected to said instrumentalities.

11. In a typewriting machine, the combination of a machine frame, an auxiliary frame that is independent of the machine frame but is removably secured thereto, said auxiliary frame comprising parallel plates that are secured together and extend fore and aft of the machine, pivot rods that project through bearing openings in said plates and extend transversely across the machine and which are removable from said bearing openings, key actuated type bar operating instrumentalities contained between said plates and vibrating on said pivot rods, and type bars operatively connected to said instrumentalities.

12. In a typewriting machine, the combination of a machine frame, an auxiliary frame that is independent of the machine frame but is removably secured thereto and comprises parallel plates that are maintained spaced apart and extend fore and aft of the machine, transversely extending pivot rods

that are situated in an inclined plane and extend through bearing openings in the said parallel plates and are removable therefrom, type bar actuating devices pivoted on said pivot rods and working between said parallel plates, and type bars operatively connected to the actuating devices.

13. In a typewriting machine, the combination of a machine frame, an auxiliary frame that is independent of the machine frame but is removably secured thereto and comprises parallel plates that are maintained spaced apart and extend fore and aft of the machine, transversely extending pivot rods that are situated in an inclined plane and extend through bearing openings in the said parallel plates and are removable therefrom, key actuated bell crank levers pivoted on said pivot rods and working between said parallel plates, type bars and intermediate connections between said type bars and bell cranks.

14. In a typewriting machine, the combination of a machine frame, an auxiliary frame that is independent of the machine frame but is removably secured thereto and comprises transversely extending supporting bars with means for securing the supporting bars to the frame of the machine, parallel plates that are supported by said supporting bars, means for maintaining said plates spaced apart, pivot rods supported by said parallel plates, key actuated type bar operating devices pivoted on said pivot rods, and type bars operatively connected to said devices.

15. In a typewriting machine, the combination of a machine frame, an auxiliary frame that is independent of the machine frame but is removably secured thereto and comprises transversely extending supporting bars with means for securing the supporting bars to the frame of the machine, parallel plates that extend fore and aft of the machine and are supported by said supporting bars, means for maintaining said plates spaced apart, pivot rods supported by and removable from said parallel plates, key actuated type bar operating bell crank levers pivoted to said pivot rods between the parallel plates, and type bars operatively connected to said bell crank levers.

16. In a typewriting machine, the combination of a machine frame, an auxiliary frame that is independent of the machine frame but is removably secured thereto and comprises transversely extending supporting bars with means for securing the supporting bars to the frame of the machine, parallel plates that extend fore and aft of the machine and are supported by said supporting bars in an inclined plane, means for maintaining said plates spaced apart, transversely extending pivot rods supported by said parallel plates in an inclined plane and

removable therefrom, type bar operating bell crank levers pivoted on said pivot rods between the parallel plates, finger keys that are pivoted directly to said bell crank levers and type bars operatively connected to said bell crank levers.

17. In a typewriting machine, the combination of a machine frame, an auxiliary frame that is independent of but is removably secured thereto, pivot rods supported by the auxiliary frame, means which secure said pivot rods in place but permit the removal thereof at will without dismantling the frame, type bars, and key actuated type bar operating devices which are pivoted on said pivot rods.

18. In a typewriting machine, the combination of a machine frame, an auxiliary frame that is independent of but is removably secured thereto, pivot rods that extend transversely across and are supported in bearing openings in the auxiliary frame, means which secure said pivot rods against endwise displacement but permit the endwise removal thereof at will, type bars, and key actuated type bar operating devices which are pivoted on said pivot rods.

19. In a typewriting machine, the combination of a machine frame, an auxiliary frame that is independent of but is removably secured thereto, pivot rods that are supported in bearings in said auxiliary frame, a movable securing plate which is adapted to secure said pivot rods in place and to permit the removal thereof, type bars, and key actuated type bar operating means which are pivoted on said pivot rods.

20. In a typewriting machine, the combination of a machine frame, an auxiliary frame that is independent of but is removably secured thereto, transversely extending pivot rods that are supported in bearing openings in said auxiliary frame, a removable securing plate which is independent of the auxiliary frame but is secured thereto and which is adapted to secure said pivot rods against endwise displacement and to permit the removal thereof when desired, type bars, and key actuated type bar operating means which are pivoted on said pivot rods.

21. In a typewriting machine, the combination of a machine frame, an auxiliary frame that is independent of but is removably secured thereto, pivot rods that are supported in bearings in said auxiliary frame and each of which is provided with a head at one end thereof, a single removable securing plate which is adapted to bear upon the heads of all of said pivot rods, and movable parts pivoted on said pivot rods.

22. In a typewriting machine, the combination of a machine frame, an auxiliary frame that is independent of but is removably secured thereto comprising parallel

plates that are spaced apart and have bearing openings therein, transversely extending pivot rods that are received in said bearing openings and are removable therefrom, a removable securing plate that is adapted to bear upon one end of each of said pivot rods to secure them against endwise movement, and movable devices which are pivoted on said pivot rods and between said plates.

23. In a typewriting machine, the combination of a machine frame, an auxiliary frame that is independent of but is removably secured to the machine frame and comprises parallel plates that extend fore and aft of the machine and are spaced apart and have bearing openings therein, transversely extending pivot rods that extend from side to side of said auxiliary frame and are received in said bearing openings and are removable therefrom, a removable securing plate that is secured to one side of the auxiliary frame and is adapted to bear upon one end of each of said pivot rods to secure them against endwise movement, means which afford the removal of said securing plate, and bell crank levers which are pivoted on said pivot rods and between said parallel plates and move fore and aft of the machine.

24. In a typewriting machine, the combination of a machine frame, type bars mounted in said machine frame, finger keys, and means connected thereto for operating the type bars, said finger keys and actuating means being supported in the machine frame so as to be placed in or removed therefrom as an entirety.

25. In a typewriting machine, the combination of a machine frame, type bars mounted in said machine frame, finger keys, bell crank levers connected thereto, and intermediate connections between the bell crank levers and type bars, said finger keys and bell crank levers and intermediate connections being supported in the machine frame so as to be placed in or removed therefrom as an entirety.

26. In a typewriting machine, the combination of parallel links, intermediate connecting links, one between each pair of parallel links, finger keys and type bars operatively connected to said links, and means for supporting the said links and finger keys in the machine in such a manner that they may be placed in or removed from the machine as an entirety.

27. In a typewriting machine, the combination of a series of key-actuated levers, a series of bell cranks, actuating connections between said key actuated levers and said bell cranks, and a universal bar common to all of said bell cranks and against which one set of the arms of said bell cranks bear to actuate it.

28. In a typewriting machine, the combination of a knife edge bearing, a key connected bell crank lever which straddles said bearing, and a universal bar against which one arm of the bell crank lever bears to actuate it.

29. In a typewriting machine, the combination of a knife edge bearing, a key actuated bell crank lever which straddles said bearing, a slotted or kerfed guide portion in which the bell crank is seated, and a universal bar against which the bell crank bears to actuate it.

30. In a typewriting machine, the combination of a series of key-actuated levers, a series of bell cranks, connections between said levers and said bell cranks, a universal bar common to all of said bell cranks and against which one set of the arms of said bell cranks bear to actuate it, and a series of springs which cooperate with said bell cranks to restore them and the parts connected therewith to their normal positions.

31. In a typewriting machine, the combination of a knife edge bearing, a key actuated bell crank lever which straddles said bearing, a universal bar against which one arm of the bell crank lever bears to actuate it, and a spring which tends to maintain said bell crank on its bearing.

32. In a typewriting machine, the combination of a knife edge bearing, a key actuated bell crank lever which straddles said bearing, a slotted or kerfed guide portion in which the bell crank is seated, a spring, a connection from said spring to the bell crank which tends through the action of the spring to maintain said bell crank on its bearing but which may be disconnected to permit the withdrawal of the bell crank from its bearing.

33. In a typewriting machine, the combination of a bearing, a bell crank lever that is adapted to vibrate on said bearing, a leaf spring, and a disconnectible connection that extends from one arm of said bell crank lever to the leaf spring to restore the lever and the parts connected thereto to the normal position and to prevent the accidental displacement of the lever from its bearing but to permit the withdrawal of the bell crank from its bearing when desired.

34. In a typewriting machine, the combination of a bearing, a bell crank lever that is adapted to vibrate on said bearing, a leaf spring, a disconnectible connection that extends from one arm of said bell crank lever to the leaf spring to restore the lever and the parts connected thereto to the normal position and to prevent the accidental displacement of the lever from its bearing but to permit the withdrawal of the bell crank from its bearing when desired, a key actuated link which is connected to one arm of said lever, a universal bar against which the

other arm of the lever bears to actuate it, a type bar, and intermediate connections between the type bar and said link.

35. In a typewriting machine, the combination of a main frame, a universal bar mounted in the main frame, an auxiliary frame removably mounted in the main frame, and key controlled actuating devices cooperative with the universal bar when the auxiliary frame is mounted in the main frame, said key controlled actuating devices being removable with the auxiliary frame.

36. In a front-strike typewriting machine, the combination of a main frame, an auxiliary frame removably mounted in the main frame, upwardly and rearwardly striking type bars, finger keys, intermediate connections between said finger keys and type bars, said connections comprising levers as controlled by said finger keys, said finger keys and levers being removable with said auxiliary frame, and a universal bar carried by the main frame and operated by said levers.

37. In a front strike typewriting machine, the combination of a radially slotted or kerfed segment, radially disposed hangers mounted in the kerfs of the segment and the stems of which extend inwardly in the general direction of the printing point and in a single vertical plane, whereas the heads of said hangers extend to different distances fore and aft of the machine and type bars of a uniform length which are pivoted to the heads of the hangers and the type bearing ends of which extend alternately to different distances fore and aft of the machine.

38. In a typewriting machine, the combination of a type bar segment made of a plurality of separable parts, means for detachably securing the parts together, and a series of type bar hangers fixed to said segment between the separable parts thereof.

39. In a typewriting machine, the combination of a type bar segment made of a plurality of interlocking parts, type bar hangers adapted to be secured against movement between said parts and means for detachably securing the parts of said segment together.

40. In a typewriting machine, the combination of a type bar segment made of a plurality of parts one of said parts being slotted or kerfed and another plane or imperforate, type bar hangers adapted to be secured in place in said slots and between said parts, and means for securing the parts of said segment together.

41. In a typewriting machine, the combination of a type bar segment made of a plurality of parts, type bar hangers adapted to be secured against movement between said parts and to be individually removable therefrom, and means for detachably securing the parts of said segment together.

42. A type bar segment comprising two

parts, one of which has a flange and the other a groove in which said flange takes to maintain the parts united, and additional means for securing the parts together.

43. In a typewriting machine, the combination of a type bar segment, comprising two parts, one of which has a flange and the other a groove in which the flange takes to maintain the parts united, type bar hangers fixed in place between the parts of said segment, and means which afford an individual removal of said hangers.

44. In a typewriting machine, the combination of a type bar segment, comprising two parts, one of which has a flange and the other a groove in which the flange takes to maintain the parts united, one of said parts being slotted or kerfed and the other plane or imperforate, type bar hangers maintained in place in said slots and between the parts of said segment, and an independent set screw for each hanger.

45. A type bar segment which is divided into two separable parts in the direction of its length, a flange on one of said parts and a groove in the other and in which the flange is adapted to be seated, one of said separable parts being slotted whereas the other is plane, and set screws carried by the slotted part or member and the ends of which screws are adapted to extend to the slots therein.

46. In a typewriting machine, the combination of a printing instrumentality, a key, and connecting links one of which has a slot and the other of which comprises a sheet metal body having a part struck up therefrom and turned on itself to form a pivot at one end adapted to said slot, and turned at its other end to form a longitudinally extending receiving socket for a rod connected to the printing instrumentality.

47. In a typewriting machine, the combination of a printing instrumentality, a key, and connecting links one of which has a slot and the other of which comprises a sheet metal body portion having two sides with an intervening space, and a cross piece that is formed of the body portion and extends from one side to the other and constitutes a pivot at one end of the link adapted to said slot, the other end of the link being turned to form a longitudinally extending receiving socket for a rod connected to the printing instrumentality.

48. In a typewriting machine, the combination of a printing instrumentality, a key, and detachable connecting links between the key and printing instrumentality, one of said links comprising a struck up barrel portion with arms that extend therefrom and a pivot carried by said arms adapted to said other link, all of said parts being formed of a single piece of sheet metal.

49. In a typewriting machine, the combination of a printing instrumentality, a key,

and detachable connecting links between the key and printing instrumentality, one of said links comprising a struck up barrel with parallel arms that extend longitudinally therefrom and are spaced apart, and a pivot which extends between and unites said arms, all of said parts being formed of a single piece of sheet metal.

50. In a front strike typewriting machine, the combination of segmentally arranged type bars, a series of parallel links, connecting links between said parallel links, and link connections between the connecting links and type bars, which link connections include adjustable means for taking up any lost motion that may exist between the parts.

51. In a front strike typewriting machine, the combination of segmentally arranged type bars, substantially horizontally disposed draw links directly connected to said type bars, means for shortening or lengthening said links at will, key actuated means connected to said links, and means which afford a disconnection of the links from the key actuated means when the links are in the non-working position.

52. In a typewriting machine, a type action including a type bar pivoted to turn on a fixed pivot, a finger key, connections between the finger key and type bar, said connections including a train of rigid devices pivotally united, means at one end of said train of devices for resisting movements of the parts in one direction and means at the other end of said train of devices for applying pressure to the parts in opposition to said resisting means.

53. In a typewriting machine, the combination of a type bar, a finger key, rigid intermediate link connections between said type bar and finger key, means which resist the movement of the finger key in one direction, and a restoring spring which tends to force all of said parts to their normal positions in such a manner that the tension of said spring will be exerted through said link connections and so that any lost motion between the parts will be taken up.

54. In a typewriting machine, the combination of a type bar, a key stem, an abutment on said key stem, a fixed abutment which coöperates with that on the key stem to resist the movement of the key stem in one direction, intermediate bell crank and link connections between the key stem and the type bar, and a spring which operates on said intermediate connections and tends to move the abutment on the key stem against the coöperating fixed abutment and to exert a strain on the intermediate parts in the same direction.

55. In a typewriting machine, the combination of a type bar, a key stem, an abut-

ment on said key stem, a fixed abutment which coöperates with that on the key stem to resist the movement of the key stem in one direction, a bell crank lever connected to said key stem, a supporting lever which has one arm that moves in parallelism with one arm of said bell crank lever, a link intermediate of said parallel moving lever arms, means for connecting said parts to the type bar and a spring which is connected to the supporting lever and exerts pressure upon the parts to move the abutment on the key stem into contact with the fixed abutment.

56. In a typewriting machine, the combination of a type bar, a key stem, an abutment on said key stem, a fixed abutment which coöperates with that on the key stem to resist the movement of the key stem in one direction, parallel links which are actuated by said key stem, an intermediate connecting link between said parallel links, means for uniting the connecting link to the type bar, and a spring which effects a pressure on one of said parallel links to move the abutment on the key stem against the fixed abutment.

57. In a typewriting machine, the combination of a type bar, a key stem, an abutment on said key stem, a fixed abutment which coöperates with that on the key stem to resist the movement of the key stem in one direction, a bell crank lever which moves fore and aft of the machine and is connected to said key stem, a supporting bell crank lever which has one arm that moves in parallelism with one arm of said bell crank lever, a connecting link intermediate of said parallel moving lever arms and which moves fore and aft of the machine, means for uniting said connecting link to the type bar, and a spring which is connected to the bell crank supporting lever and exerts pressure upon the parts to move the abutment on the key stem into contact with the fixed abutment.

58. In a front strike typewriting machine, the combination of a key stem, an abutment on said key stem, a fixed plate through which the key stem works and with which the abutment is adapted to contact, a bell crank lever located beneath the key board of the machine and with which the key stem directly connects, a connecting link pivoted at one end to one arm of the bell crank and at its opposite end to an arm of a supporting lever which moves in parallelism therewith, a connection between the connecting link and type bar, and a spring which is connected to the supporting lever and exerts a pressure through the intermediate parts to force the abutment on the key stem into contact with the coöperating fixed plate.

59. In a typewriting machine, the combination of type bars, key actuated bell crank levers of a uniform size, and links between said bell crank levers and type bars, said links having projections that extend therefrom to varying extents.

60. In a typewriting machine, the combination of segmentally arranged type bars, key actuated bell crank levers of a uniform size, and intermediate links between said bell crank levers and type bars, said links having projections that extend therefrom to gradually increasing extents as the type bars at the sides of the segment are approached.

61. In a typewriting machine, the combination of type bars, key actuated bell crank levers of a uniform size which are mounted to vibrate fore and aft of the machine, and intermediate links between said bell crank levers and type bars and which are adapted to vibrate fore and aft of the machine, said links having projections that extend therefrom to varying extents.

62. In a typewriting machine, the combination of segmentally arranged type bars that are adapted to strike rearwardly, key actuated bell crank levers, parallel actuating links intermediate of the bell crank levers and type bars, and converging projections which extend from said links to varying extents.

63. In a typewriting machine, the combination of segmentally arranged type bars, key actuated bell crank levers, intermediate links that are situated in a single plane and extend to varying extents fore and aft of the machine, and upwardly extending projections that extend from said links.

64. In a typewriting machine, the combination of segmentally arranged type bars, key actuated bell crank levers, intermediate links that are situated in a single plane and extend to varying extents fore and aft of the machine, and upwardly extending projections that extend from said links to varying extents and through which connection is made with the type bars.

65. In a typewriting machine, the combination of segmentally arranged type bars, key actuated bell crank levers, intermediate links that are situated in a single plane and extend to varying extents fore and aft of the machine, and upwardly extending converging projections that extend from said links to increasing extents as the type bars at the sides of the segment are approached.

66. In a typewriting machine, the combination of segmentally arranged type bars that are adapted to strike rearwardly, key actuated bell crank levers, parallel actuating links intermediate of the bell crank levers and type bars, and projections which extend from said links to varying extents and are situated in a single transverse plane and through which connection is made with the type bars.

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67. In a typewriting machine, the combination of segmentally arranged type bars, key actuated bell crank levers of a uniform size that vibrate fore and aft of the machine, actuating links intermediate of the bell cranks and type bars, said links being situated in a single plane and being of different lengths, and upwardly extending projections that extend from said links and through which connection is made with the type bars.

68. In a typewriting machine, the combination of segmentally arranged type bars, key actuated bell crank levers of a uniform size that vibrate fore and aft of the machine, actuating links intermediate of the bell cranks and type bars, said links being situated in a single inclined plane and being of different lengths, and upwardly extending converging projections that extend from said links to increasing extents as the type bars at the sides of the segment are approached and through which connection is made with the type bars.

69. In a typewriting machine, the combination of segmentally arranged type bars, key actuated bell crank levers of a uniform size that vibrate fore and aft of the machine, actuating links intermediate of the bell cranks and type bars and which vibrate in the direction of their lengths and fore and aft of the machine, said links being situated in a single inclined plane and being of different lengths, and upwardly extending converging projections that extend from said links and through which connection is made with the type bars.

70. In a typewriting machine, the combination of segmentally arranged type bars, key actuated bell crank levers that are situated at different heights fore and aft of the machine, actuating links of varying lengths that connect with said bell cranks, and upwardly extending arms on said links and through which connection is made with the type bars.

71. In a typewriting machine, the combination of segmentally arranged type bars, key actuated bell crank levers of a uniform size that are situated at different heights fore and aft of the machine, actuating links of varying lengths that connect with said bell cranks, and are situated in a single plane, and upwardly extending arms that project from said links to varying extents and through which connection is made with the type bars.

72. In a typewriting machine, the combination of segmentally arranged type bars, key actuated bell crank levers that vibrate fore and aft of the machine and are situated at different heights fore and aft of the machine, actuating links of varying lengths that connect with said bell cranks and vibrate lengthwise fore and aft of the ma-

chine, and upwardly extending converging arms that project from said links and to varying extents in a single plane transverse of the machine and through which connection is made with the type bars.

73. In a typewriting machine, the combination of segmentally arranged type bars, key actuated bell crank levers of a uniform size that are mounted at different heights and vibrate fore and aft of the machine, actuating links that extend to different extents fore and aft of the machine where they make connection with the said bell cranks and which vibrate in the directions of their lengths fore and aft of the machine, and converging projections which extend upwardly from links to increasing extents as the type bars at the sides of the segment are approached.

74. In a typewriting machine, the combination of segmentally arranged type bars, key actuated bell crank levers of a uniform size that are mounted at progressively increasing heights from front to rear of the machine and vibrate fore and aft of the machine, actuating links that are situated in a single plane and extend to different extents fore and aft of the machine where they make connection with the said bell cranks and which vibrate in the directions of their lengths fore and aft of the machine, and converging projections which extend upwardly from links in a single plane transverse of the machine and to increasing extents as the type bars at the sides of the segment are approached.

75. In a front strike typewriting machine, the combination of segmentally arranged type bars, key actuated bell crank levers that are mounted at progressively greater heights from front to rear of the machine, actuating links that extend fore and aft of the machine and are connected to said bell crank levers and terminate at their rear ends in a single plane transverse of the machine, and means for connecting said links to the type bars.

76. In a front strike typewriting machine, the combination of segmentally arranged type bars, key actuated bell crank levers that are mounted at progressively greater heights from front to rear of the machine, actuating links that extend fore and aft of the machine and are connected to said bell crank levers and are situated in a single plane, and upwardly extending arms on said links which afford connections between the links and type bars.

77. In a front strike typewriting machine, the combination of segmentally arranged type bars, key actuated bell crank levers that are mounted at progressively greater heights from front to rear of the machine, actuating links that extend fore and aft of the machine where they are connected to

said bell crank levers, said links being situated in a single plane terminating at their rear ends in a single plane transverse of the machine, and upwardly extending converging arms on said links which afford connections between the links and type bars.

78. In a front strike typewriting machine, the combination of an upwardly and rearwardly striking type bar which in the normal position thereof is arranged fore and aft of the machine, parallel links, an actuating link which is united to said parallel links to move fore and aft of the machine, and connections from said actuating link to the type bar, so that the fore and aft movement of the connecting link is effective to actuate the type bar.

79. In a front strike typewriting machine, the combination of a type bar, parallel actuating lever arms, an actuating link which is united to said arms, direct connections from said actuating link to the type bar, a finger key, and connections from said finger key to one of said lever arms.

80. In a front strike typewriting machine, the combination of a type bar, parallel lever arms that vibrate fore and aft of the machine, an actuating link which is united to said parallel lever arms, and vibrates lengthwise fore and aft of the machine, a connecting link from said actuating link to the type bar, a finger key, and a connection from said finger key to one of said lever arms.

81. In a front strike typewriting machine, the combination of upwardly and rearwardly striking type bars which in their normal position are arranged fore and aft of the machine, a pair of key actuated parallel links that move fore and aft of the machine for each of said type bars, a connecting link that is united to each pair of parallel links and all of which connecting links terminate in a single plane transverse of the machine, and connections from said connecting links to the type bars, so that the fore and aft movements of the connecting links operate to swing the type bars.

82. In a front strike typewriting machine, the combination of segmentally arranged type bars, key actuated bell crank levers which have arms that move in parallelism, connecting links that unite the parallel arms of the bell cranks, projections that extend upwardly from said connecting links, and means for connecting said projections to the type bars.

83. In a front strike typewriting machine, the combination of segmentally arranged type bars, key actuated bell crank levers which have arms that move in parallelism and vibrate fore and aft of the machine, connecting links that unite the parallel arms of the bell cranks and move endwise fore and

aft of the machine, converging projections that extend upwardly from said connecting links, and means for connecting said projections to the type bars.

84. In a front strike typewriting machine, the combination of segmentally arranged type bars, key actuated bell crank levers which have arms that move in parallelism, connecting links that unite the parallel arms of the bell cranks and all of which connecting links are in the same plane, projections that extend upwardly from said connecting links to different extents, and means for connecting said projections to the type bars.

85. In a front strike typewriting machine, the combination of segmentally arranged type bars, key actuated bell crank levers which have arms that move in parallelism and vibrate fore and aft of the machine, connecting links that unite the parallel arms of the bell cranks, converging projections that extend upwardly from said links to increasing heights as the type bars at the sides of the segment are approached, and means for connecting said projections to the type bars.

86. In a typewriting machine, the combination of segmentally arranged type bars, key actuated bell crank levers which have arms that move in parallelism and vibrate fore and aft of the machine, connecting links that unite the parallel arms of the bell cranks and all of which links are in the same plane and terminate at their rear ends in a single plane that extends transverse of the machine, converging projections that extend upwardly from said links to increasing heights as the type bars at the sides of the segment are approached and which vibrate with the links fore and aft of the machine, and means for connecting said projections to the type bars.

87. In a front strike typewriting machine, the combination of segmentally arranged type bars, key actuated bell crank levers which are arranged at different heights fore and aft of the machine, cooperating link arms, each of which moves in parallelism with an arm of a bell crank lever, connecting links uniting the bell crank and link arms which move in parallelism, and projections that extend upwardly from said connecting links and through which connection is made with the type bars.

88. In a front strike typewriting machine, the combination of segmentally arranged type bars, bell crank levers which are arranged at different heights fore and aft of the machine, finger keys connected to said bell cranks, link arms, each of which moves in parallelism with an arm of a bell crank lever, parallel connecting links uniting the bell crank and link arms which move in parallelism, and projections that extend up-

wardly to different extents from said connecting links and through which connection is made with the type bars.

89. In a front strike typewriting machine, the combination of segmentally arranged type bars, key actuated bell crank levers which are arranged at progressively greater heights from front to rear of the machine, cooperating link arms, each of which moves in parallelism with an arm of a bell crank lever, connecting links uniting the bell crank and link arms which move in parallelism, and projections that extend upwardly from said connecting links to progressively increasing heights and as the type bars at the sides of the segment are approached and through which projections connection is made with the type bars.

90. In a front strike typewriting machine, the combination of segmentally arranged type bars, bell crank levers beneath the keyboard of the machine and arranged at progressively greater heights from front to rear of the machine, finger keys connected to said bell crank levers, link arms disposed in a single vertical plane and each of which moves in parallelism with an arm of a bell crank lever, connecting links between each pair of said parallel moving bell crank and link arms, upwardly extending arms that project from said connecting links, and means for connecting said upwardly projecting arms to the type bars.

91. In a front strike typewriting machine, the combination of segmentally arranged type bars, bell crank levers beneath the keyboard of the machine and arranged at progressively greater heights from front to rear of the machine, finger keys connected directly to said bell crank levers, link arms disposed in a single vertical plane and each of which moves in parallelism with an arm of a bell crank lever, connecting links between each pair of said parallel moving bell crank and link arms, said connecting links being in a single plane, upwardly extending converging arms that project from said connecting links to different extents, and means for connecting said upwardly projecting arms to the typebars.

92. In a front strike typewriting machine, the combination of segmentally arranged type bars, bell crank levers beneath the keyboard of the machine and arranged at progressively greater heights from front to rear of the machine, finger keys connected directly to said bell crank levers, link arms disposed in a single vertical plane and each of which moves in parallelism with an arm of a bell crank lever, connecting links between each pair of said parallel moving bell crank and link arms, said connecting links being in a single plane and projecting to different extents at their forward ends, upwardly extending converging arms that pro-

ject from said connecting links to increasing extents as the type bars at the sides of the segment are approached, and means for connecting said upwardly projecting arms to the type bars.

93. In a front strike typewriting machine, the combination of segmentally arranged upwardly and rearwardly striking type bars, parallel links that are mounted upon horizontal pivotal bearings and vibrate fore and aft of the machine, a connecting link between each pair of parallel links, and means for connecting said connecting links with the type bars, so that the fore and aft movements of the connecting links will apply pressure in like directions to the type bars.

94. In a typewriting machine, the combination of type bars, key actuated bell crank levers that are arranged at progressively greater heights from front to rear of the machine, connecting links connected to upwardly projecting arms of said bell cranks, links which support the rear ends of said connecting links and move in parallelism with the upwardly projecting arms of the bell cranks, upwardly projecting converging arms that extend from said connecting links to different heights, and connections from said upwardly projecting arms of the connecting links to the type bars.

95. In a typewriting machine, the combination of type bars, key actuated bell crank levers of a uniform size that are arranged at progressively greater heights from front to rear of the machine and which vibrate from front to rear of the machine, connecting links that are in the same plane and are connected to upwardly projecting arms of said bell cranks, links which support the rear ends of said connecting links and move in parallelism with the upwardly projecting arms of the bell cranks, upwardly projecting converging arms that extend from said connecting links to different heights, and connections from said upwardly projecting arms of the connecting links to the type bars.

96. In a front strike typewriting machine, the combination of segmentally arranged type bars, key actuated bell crank levers of a uniform size that are arranged at progressively greater heights from front to rear of the machine, connecting links connected to the upwardly projecting arms of said bell cranks, links that are mounted in a single vertical plane and support the rear ends of said connecting links and move in parallelism with the upwardly projecting arms of the bell cranks, upwardly projecting converging arms that extend from said connecting links to progressively increasing heights, and connections from said upwardly projecting arms of the connecting links to the type bars.

97. In a front strike typewriting machine,

the combination of segmentally arranged type bars, bell crank levers of a uniform size that are arranged at progressively greater heights from front to rear of the machine and vibrate on horizontal pivots, finger keys which are connected to said bell crank levers, parallel connecting links that are connected to upwardly projecting arms of said bell cranks, links that are mounted in a single vertical plane on a horizontal pivotal center and support the rear ends of said connecting links and move in parallelism with the upwardly projecting arms of the bell cranks, converging projections that extend upwardly from said connecting links to progressively greater heights as the type bars at the sides of the segment are approached, and means for connecting said projections with the type bars.

98. In a front strike typewriting machine, the combination of segmentally arranged type bars, bell crank levers of a uniform size that are arranged beneath the keyboard of the machine and at progressively greater heights from front to rear of the machine and vibrate on horizontal pivots fore and aft of the machine, finger keys which are directly connected to said bell crank levers, parallel connecting pull links that are situated in an inclined plane and are connected to upwardly projecting arms of said bell cranks, links that are mounted in a single vertical plane on a horizontal pivotal center and support the rear ends of said connecting pull links and move in parallelism with the upwardly projecting arms of the bell cranks, converging projections that extend upwardly from said connecting links to progressively greater heights as the type bars at the sides of the segment are approached, and pull links for connecting said projections with the type bars.

99. In a front strike typewriting machine, the combination of segmentally arranged type bars, horizontally disposed pull links connected to said type bars, key actuated parallel links, connecting links between the parallel links, and means for directly connecting the pull links to the connecting links.

100. In a typewriting machine, the combination of a series of type bars, a series of finger keys arranged in transverse rows, a series of key actuated bell crank levers located beneath the key board of the machine, a series of connecting links that are pivoted to said bell cranks and move fore and aft of the machine, the links for each transverse row of keys being of the same length, and connections between said links and type bars.

101. In a typewriting machine, the combination of a series of type bars, a series of finger keys arranged in transverse rows, a series of key actuated bell crank levers located beneath the keyboard of the machine

and at progressively increasing heights from front to rear of the machine, a series of parallel connecting links that are pivoted to said bell cranks and move fore and aft of the machine, the links for each transverse row of keys being of the same length, and connections between said links and type bars.

102. In a typewriting machine, the combination of a series of type bars, a series of finger keys arranged in transverse rows, a series of key actuated bell crank levers of a uniform size located beneath the keyboard of the machine and at different heights, a series of connecting links that are situated in the same plane and are pivoted to said bell cranks and move fore and aft of the machine, the links for each transverse row of keys being of the same length, and connections between said links and type bars.

103. In a typewriting machine, the combination of type bars, a series of finger keys arranged in transverse rows, a series of links which move in parallelism fore and aft of the machine and which are arranged in pairs at different distances apart, a connecting link between each pair of said parallel links, means for connecting said connecting links to the type bars, each transverse row of finger keys being connected to connecting links of the same length.

104. In a typewriting machine, the combination of type bars, a series of links which move in parallelism fore and aft of the machine, connecting links of different lengths between said parallel links, the rear ends of said connecting links terminating at a single transverse line, means for connecting said connecting links to the type bars, a series of finger keys arranged in transverse rows, each transverse row of finger keys being connected with connecting links of the same length.

105. In a typewriting machine, the combination of a series of type bars, a series of key actuated bell crank levers, an arm of one bell crank, working between arms of an adjacent bell crank, and operative connections between said bell cranks and type bars.

106. In a typewriting machine, the combination of a series of type bars, a series of key actuated bell crank levers which are located at different heights, an arm of one bell crank working between arms of an adjacent bell crank, and operative connections between said bell cranks and type bars.

107. In a typewriting machine, the combination of a series of type bars, a series of key actuated bell crank levers of a uniform size which are located at progressively increasing heights from front toward the rear of the machine, an arm of one bell crank working between arms of an adjacent bell crank, and operative connections between said bell cranks and type bars.

108. In a typewriting machine, the com-

5 combination of a series of type bars, a series of key actuated bell crank levers of a uniform size which are located at progressively increasing heights from front toward the rear of the machine, an arm of one bell crank working between arms of an adjacent bell crank, links that move fore and aft of the machine, and connections between said links and type bars.

10 109. In a typewriting machine, the combination of a series of type bars, a series of key actuated bell crank levers of a uniform size which are located at progressively increasing heights from front toward the rear of the machine, an arm of one bell crank working between arms of an adjacent bell crank, draw links of different lengths that extend fore and aft of the machine, and which are pivoted to said bell cranks, and connections between said draw links and the type bars.

15 110. In a typewriting machine, the combination of a series of type bars, a series of key actuated bell crank levers of a uniform size which are located at progressively increasing heights from front toward the rear of the machine, an arm of one bell crank working between arms of an adjacent bell crank, parallel draw-links of different lengths that extend fore and aft of the machine and terminate at their rear ends at a single transverse line, pivotal connections between said draw links and the bell crank levers and intermediate connections between said draw links and type bars.

20 111. In a typewriting machine, the combination of key stems, bell crank levers, to which said stems are connected, a bell crank lever arm and key stem of one action working between lever arms of an adjacent bell crank, type bars, and intermediate connections between the bell cranks and type bars.

25 112. In a typewriting machine, the combination of key stems arranged at progressively increasing heights from front to rear of the machine, bell crank levers of a uniform size to which said stems are connected, a bell crank lever arm and key stem of one action working between lever arms of a bell crank beneath it, type bars, and intermediate connections between the bell cranks and type bars.

30 113. In a typewriting machine, the combination of key actuated bell crank levers which are arranged in straight rows fore and aft of the machine and at different heights, a lever arm of one bell crank working between lever arms of an adjacent bell crank, type bars, and intermediate connections between the type bars and bell cranks.

35 114. In a typewriting machine, the combination of key actuated bell crank levers which are arranged in straight rows fore and aft of the machine and at progressively

increasing heights from front toward the rear of the machine, a lever arm of one bell crank working between lever arms of a bell crank beneath it, type bars, and intermediate draw links between the type bars and bell cranks.

40 115. In combination with a printing element and a key, a bell crank comprising independent crank arms that are connected to move together, one of said arms being formed of two sides that are spaced apart and with connections between them.

45 116. In a type action, the combination with a printing element and a key, of a bell crank formed of a bearing piece having a flattened side or sides, and apertured crank arms fitted on said bearing piece and locked to turn therewith by the flattened side or sides.

50 117. In combination with a printing element and a key, a bell crank lever comprising a bearing piece, and an independent crank arm connected thereto and extending therefrom, said crank arm being formed of two sides and a cross connection struck up from a single piece.

55 118. In combination with a printing element and a key, a bell crank formed of a bearing piece having a flattened side or sides, and crank arms on said bearing piece, one of said crank arms being formed of two sides and a cross connection that are struck up from a single piece.

60 119. In combination with a printing element and a key, a bell crank lever comprising a bearing piece, crank arms that are separate from but are connected to and extend from said bearing piece, one of said arms being formed of converging sides and a cross connection.

65 120. In combination with a printing element and a key, a bell crank lever comprising a bearing piece or sleeve having a flattened side, crank arms that are seated on and adapted to turn with said bearing piece, one of said arms being formed of converging sides and a cross connection.

70 121. In a typewriting machine, the combination of a bell crank lever comprising a bearing sleeve, crank arms extending from said sleeve, one of said crank arms having converging sides and a cross connection, a finger key connected to the converging sides at the free ends thereof, and a pivot which extends through said bearing sleeve.

75 122. In a typewriting machine, the combination of a bell crank lever comprising a bearing sleeve having a flattened side, crank arms seated on said sleeve and adapted to vibrate therewith, one of said crank arms having converging sides and a cross connection, the arms being spaced apart at the points of connection thereof with the bearing sleeve, a finger key connected to the con-

verging sides at the free ends thereof, and a pivot which extends through said bearing sleeve.

123. In a typewriting machine, the combination of a series of key actuated bell crank levers, each formed of crank arms that are connected to move together and one crank arm of each bell crank comprising two sides with a connection between them, the parts being so related that a crank arm of one bell crank will work between the connected sides of a crank arm of another bell crank, type bars, and connections between type bars and bell cranks.

124. In a typewriting machine, the combination of a series of key actuated bell crank levers, each formed of a bearing sleeve, crank arms that are connected together through said sleeve and one crank arm of each bell crank comprising two sides with a connection between them, the parts being so related that a crank arm of one bell crank will work between the connected sides of a crank arm of another bell crank, pivots on which said bell cranks vibrate, type bars, and connections between the type bars and bell cranks.

125. In a typewriting machine, the combination of a series of bell crank levers that are arranged one above another and each formed of a bearing sleeve, crank arms that are seated on and connected together through said sleeve and one crank arm of each bell crank comprising two converging sides with a connection between them, finger keys that are connected to the free ends of the converging sides, the parts being so related that a crank arm of one bell crank will work between the connected sides of a crank arm of a bell crank below it, horizontal pivots on which said bell cranks vibrate, type bars, and connections between the type bars and bell cranks.

126. In a typewriting machine, the combination of a series of key actuated bell crank levers, each comprising crank arms, a bearing that is wider than the crank arms, and on which the arms are seated, the crank arms of the different bell cranks being situated at different points widthwise of the bearings, type bars and connections from the bell cranks to the type bars.

127. In a typewriting machine, the combination of a series of key actuated bell crank levers, each comprising crank arms, a bearing sleeve that is wider than the crank arms and on which the arms are seated, means on each bearing sleeve which prevent the crank arms from turning thereon, the crank arms of the different bell cranks being situated at different points widthwise of the bearing sleeves, pivots on which said bearing sleeves turn, type bars and connections from the bell cranks to the type bars.

128. In combination with a printing element and a key, a bell crank having an upright arm and a forwardly projecting arm, the latter comprising two members spread apart at their bearing end and inclined toward each other or converging at their opposite or key end.

129. In a typewriting machine, the combination of a key actuated endwise movable bar, links on which said bar is mounted, a pivoted type bar, and a link connected at one end to the type bar and detachably connected at the other end to the endwise movable bar.

130. In a typewriting machine, the combination of a key actuated endwise movable bar, links on which said bar is mounted, a pivoted type bar, and an adjustable link connected at one end to the type bar and at the other end to the endwise movable bar.

131. In a front strike typewriting machine, the combination of an upwardly and rearwardly striking type bar, which in the normal position thereof is arranged fore and aft of the machine, parallel links, a connecting link that extends in the general direction of the type bar and is connected at its end portions to said parallel links and is operatively connected at its rear end portion to said type bar.

132. A detachable keybank comprising a supporting frame, a series of parallel rods mounted thereon, and a series of key actuated devices pivotally mounted upon said rods.

133. A detachable keybank comprising a supporting frame, a series of parallel rods mounted thereon, a series of levers mounted upon said rods and keys connected to said levers.

134. A detachable keybank such as described comprising a supporting frame, a series of parallel rods mounted thereon, and a series of furcated key levers mounted upon said rods.

135. A detachable keybank such as described comprising a frame, a series of pivot rods, and a series of furcated key levers mounted upon each of said pivot rods.

136. In a front-strike typewriting machine containing a typebar segment whose center of curvature is at the front of the platen, a type action comprising a pivoted type-bar mounted on said segment, a pair of devices pivoted on fixed axes parallel to the axis of the platen and lying in front of a vertical plane containing the axis of the platen, each of said devices having an arm extending above the pivotal axis of the device, a link pivoted to each of said arms, and a connection between said link and the type-bar.

137. In a front-strike typewriting machine containing a typebar segment whose

center of curvature is at the front of the platen, a type action comprising a pivoted typebar mounted on said segment, a pair of devices pivoted on fixed axes parallel to the axis of the platen and lying in front of a vertical plane containing the axis of the platen, one of said devices being an angular lever and each of said devices having an arm extending above the pivotal axis of the device, a link pivoted to each of said arms, and a connection between said link and the typebar.

138. In a front-strike typewriting machine containing a typebar segment whose center of curvature is at the front of the platen, a type action comprising a pivoted typebar mounted on said segment, a pair of devices pivoted on fixed axes parallel to the axis of the platen and lying in front of a vertical plane containing the axis of the platen, each of said devices having an arm extending above the pivotal axis of the device, a link pivoted to each of said arms, and another link pivoted to the aforesaid link and to the typebar.

139. In a front-strike typewriting machine containing a typebar segment whose center of curvature is at the front of the platen, a type action comprising a pivoted typebar mounted on said segment, a pair of devices pivoted on fixed axes parallel to the axis of the platen and lying in front of a vertical plane containing the axis of the platen, one of said devices being an angular lever and each of said devices having an arm extending above the pivotal axis of the device, a link pivoted to each of said arms, and another link pivoted to the aforesaid link and to the typebar.

140. In a front-strike typewriting machine containing a typebar segment whose center of curvature is at the front of the platen, a type action comprising a pivoted typebar mounted on said segment, a pair of devices pivoted on fixed axes parallel to the axis of the platen and lying in front of a vertical plane containing the axis of the platen, one of said devices being an angular lever extending in front of its pivotal axis, and each of said devices having an arm extending above the pivotal axis of the device, a link pivoted to each of said arms, a connection between said link and the typebar, and means including a finger key operative on said angular lever in front of its pivotal axis.

141. In a front-strike typewriting machine containing a typebar segment whose center of curvature is at the front of the platen, a type action comprising a pivoted typebar mounted on said segment, a pair of devices pivoted on fixed axes parallel to the axis of the platen and lying in front of a vertical plane containing the axis of the platen, one of said devices being an angular

lever extending in front of its pivotal axis, and each of said devices having an arm extending above the pivotal axis of the device, a link pivoted to each of said arms, another link pivoted to the aforesaid link and to the typebar, and means including a finger-key operative on said angular lever in front of its pivotal axis.

142. In a front-strike typewriting machine containing a typebar segment whose center of curvature is at the front of the platen, a type action comprising a pivoted typebar mounted on said segment, a pair of devices pivoted on fixed axes parallel to the axis of the platen and lying in front of a vertical plane containing the axis of the platen, each of said devices having an arm extending above the pivotal axis of the device, a link pivoted to each of said arms and including an upright portion extending above the lowermost part of the segment, and a connection between the upright portion of said link and the typebar.

143. In a front-strike typewriting machine containing a typebar segment whose center of curvature is at the front of the platen, a type action comprising a pivoted typebar mounted on said segment, a pair of devices pivoted on fixed axes parallel to the axis of the platen and lying in front of a vertical plane containing the axis of the platen, each of said devices having an arm extending above the pivotal axis of the device, a link pivoted to each of said arms and including an upright portion extending above the lowermost part of the segment and another link pivoted to the upright portion of the aforesaid link and to the typebar.

144. In a front-strike typewriting machine containing a typebar segment whose center of curvature is at the front of the platen, a type action comprising a pivoted typebar mounted on said segment, a pair of devices pivoted on fixed axes parallel to the axis of the platen and lying in front of a vertical plane containing the axis of the platen, each of said devices having an arm extending above the pivotal axis of the device, a link pivoted to each of said arms and including an upright portion lying in front of the segment, and a connection between the upright portion of said link and the typebar.

145. In a front-strike typewriting machine containing a typebar segment whose center of curvature is at the front of the platen, a type action comprising a pivoted typebar mounted on said segment, a pair of devices pivoted on fixed axes parallel to the axis of the platen and lying in front of a vertical plane containing the axis of the platen, each of said devices having an arm extending above the pivotal axis of the device, a link pivoted to each of said arms and

including an upright portion lying in front of the segment, and another link pivoted to the upright portion of the aforesaid link and to the typebar.

146. In a front-strike typewriting machine containing a typebar segment whose center of curvature is at the front of the platen, a type action comprising a pivoted typebar mounted on said segment, a link mounted on four axes and including an upright portion extending above the lowermost part of the segment, and a connection between the upright portion of said link and the typebar.

147. In a front-strike typewriting machine containing a typebar segment whose center of curvature is at the front of the platen, a type action comprising a pivoted typebar mounted on said segment, a link mounted on four axes and including an upright portion lying in front of the segment, and a connection between the upright portion of said link and the typebar.

148. In a front-strike typewriting machine containing a typebar segment whose center of curvature is at the front of the platen, a type action comprising a pivoted typebar mounted on said segment, a link mounted on four axes and including an upright portion extending above the lowermost part of the segment, and another link pivoted to the upright portion of the aforesaid link and to the typebar.

149. In a front-strike typewriting machine containing a typebar segment whose center of curvature is at the front of the platen, a type action comprising a pivoted typebar mounted on said segment, a link mounted on four axes and including an upright portion lying in front of the segment, and another link pivoted to the upright portion of the aforesaid link and to the typebar.

150. In a front-strike typewriting machine containing a typebar segment whose center of curvature is at the front of the platen, a type action comprising a pivoted typebar mounted on said segment, a link mounted on four axes and including an upright portion extending above the lowermost part of the segment, two of said axes being fixed and the others being movable in directions more nearly horizontal than vertical, and a connection between the upright portion of said link and the typebar.

151. In a front-strike typewriting machine containing a typebar segment whose center of curvature is at the front of the platen, a type action comprising a pivoted typebar mounted on said segment, a link mounted on four axes and including an upright portion lying in front of the segment, two of said axes being fixed and the others being movable in directions more nearly horizontal than vertical, and a connection

between the upright portion of said link and the typebar.

152. In a front-strike typewriting machine containing a typebar segment whose center of curvature is at the front of the platen, a type action comprising a pivoted typebar mounted on said segment, a link mounted on four axes and including an upright portion extending above the lowermost part of the segment, two of said axes being fixed and the others being movable in directions more nearly horizontal than vertical, and another link pivoted to the upright portion of the aforesaid link and to the typebar.

153. In a front-strike typewriting machine containing a typebar segment whose center of curvature is at the front of the platen, a type action comprising a pivoted typebar mounted on said segment, a link mounted on four axes and including an upright portion lying in front of the segment, two of said axes being fixed and the others being movable in directions more nearly horizontal than vertical, and another link pivoted to the upright portion of the aforesaid link and to the typebar.

154. In a front-strike typewriting machine containing a typebar segment whose center of curvature is at the front of the platen, a system of type actions comprising pivoted typebars mounted on the segment, a set of links each mounted on four axes, said links including upright portions extending above the lowermost part of the segment, and connections between the upright portions of said links and the typebars, those ends of the connections which are secured to the links being at elevations progressively increasing from the middle to the sides of the system.

155. In a front-strike typewriting machine containing a typebar segment whose center of curvature is at the front of the platen, a system of type actions comprising pivoted typebars mounted on the segment, a set of links, each mounted on four axes, said links including upright portions lying in front of the segment, and connections between the upright portions of said links and the typebars, those ends of the connections which are secured to the links being at elevations progressively increasing from the middle to the sides of the system.

156. In a front-strike typewriting machine containing a typebar segment whose center of curvature is at the front of the platen, a system of type actions comprising pivoted typebars mounted on the segment, a set of links, each mounted on four axes, said links including upright portions extending above the lowermost part of the segment, and connecting links pivoted to the upright portions of said other links and to the typebars, those ends of the connecting

links which are secured to the other links being at elevations progressively increasing from the middle to the sides of the system.

157. In a front-strike typewriting machine containing a typebar segment whose center of curvature is at the front of the platen, a system of type actions comprising pivoted typebars mounted on the segment, a set of links, each mounted on four axes, said links including upright portions lying in front of the segment, and connecting links pivoted at their front ends to the upright portions of said other links and at their rear ends to the typebars, the front ends of the connecting links being at elevations progressively increasing from the middle to the sides of the system.

158. In a typewriting machine, the combination of a series of type bars, a series of angular actuating levers for said type bars and connections from said angular levers to said type bars, the ends of different arms of

said angular levers which are united to said connections being at different points widthwise of the bearings of said levers.

159. In a typewriting machine, the combination of a series of type bars, a series of angular actuating levers for said type bars, said angular levers being arranged in rows fore and aft of the machine, and actuating connections between said type bars and angular levers, the ends of the different arms of the actuating levers for each row which are united to said actuating connections being at different points widthwise of the bearings of said levers.

Signed at Syracuse in the county of Onondaga and State of New York, this 2nd day of Oct. A. D. 1902.

ALEXANDER T. BROWN.

Witnesses:

CHARLES J. TONER,
F. G. BODELL.