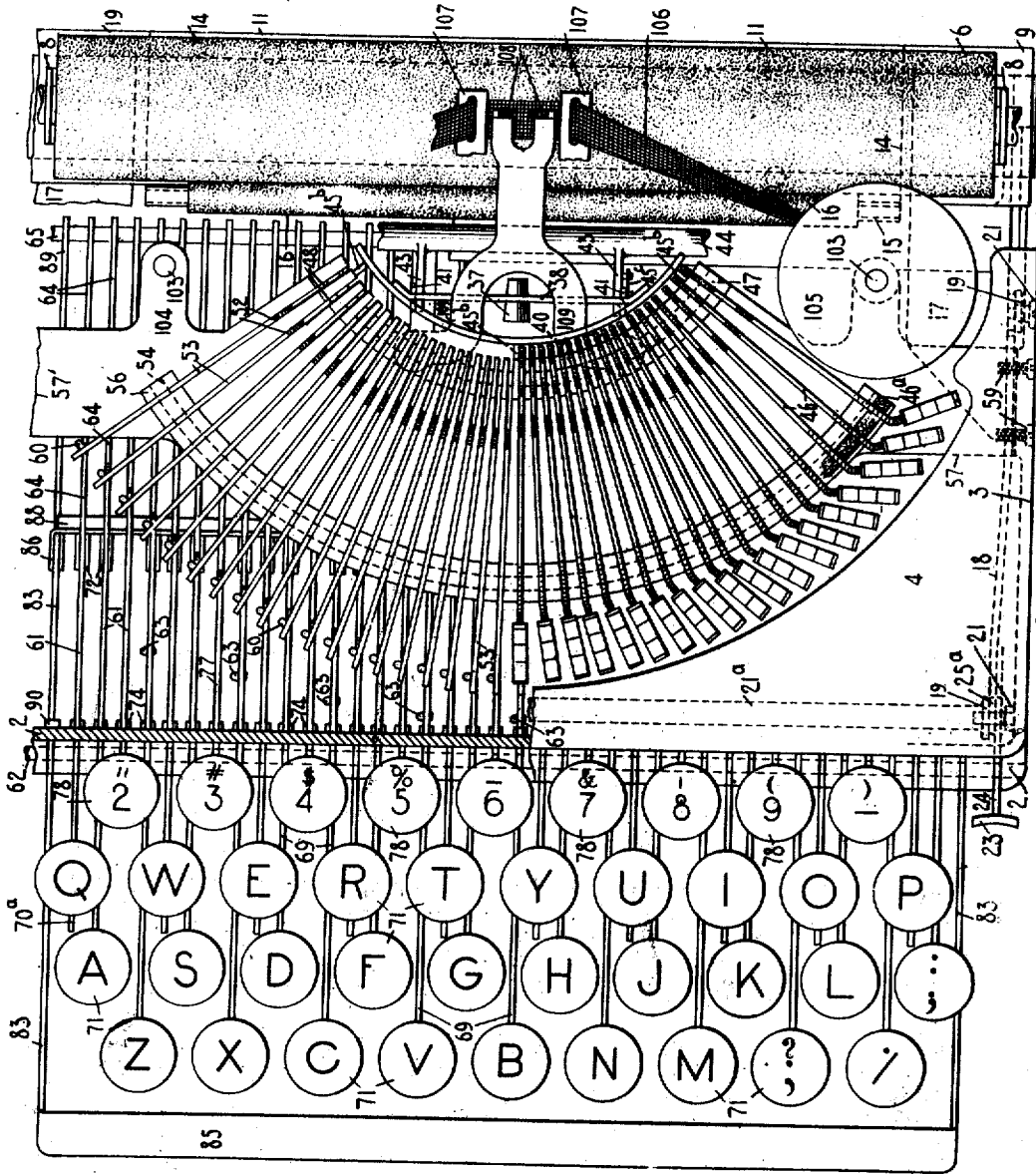


1,267,356.

Patented May 28, 1918.
4 SHEETS—SHEET 1.



WITNESSES.

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By Jacob F. Felt

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FIG. 1.

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FIG. 2.

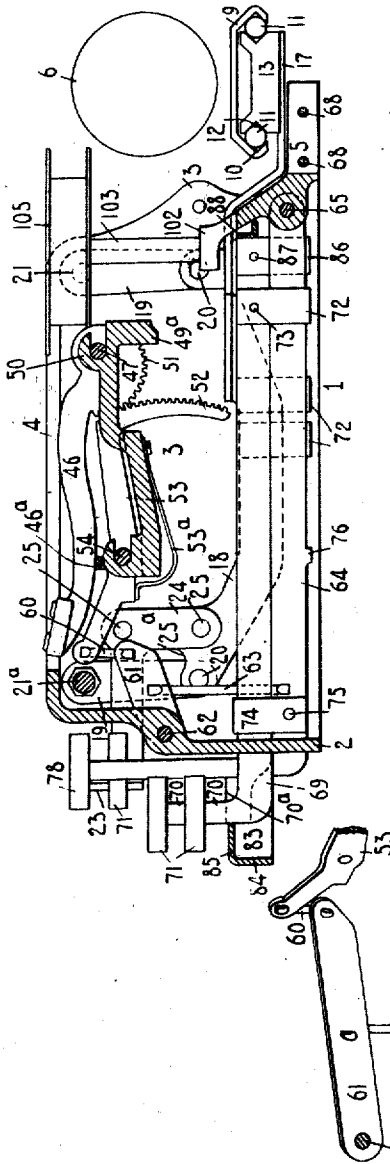


FIG. 3.

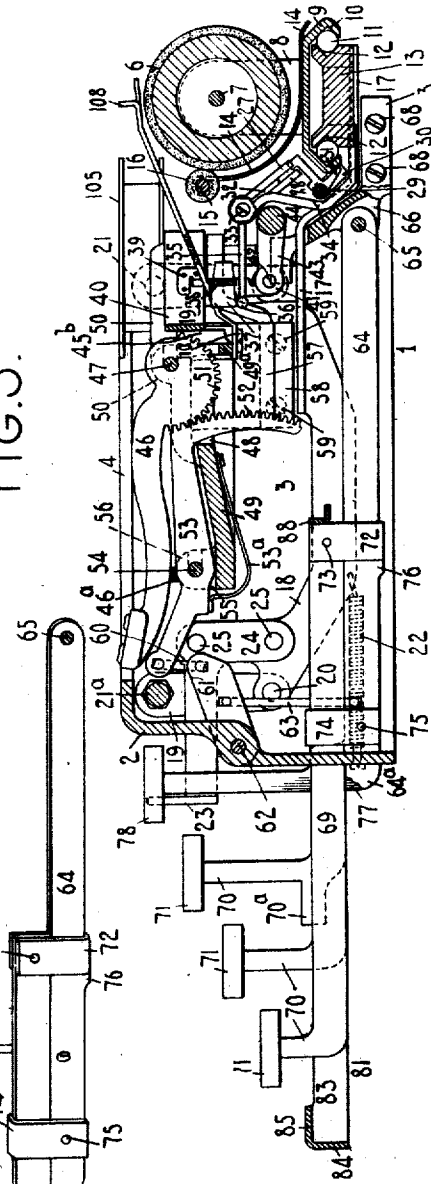
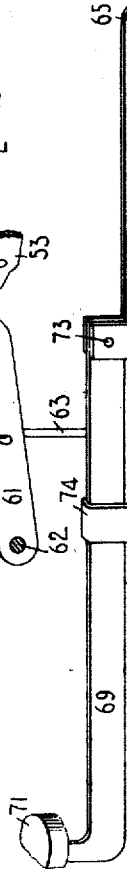


FIG. 11.



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4 SHEETS--SHEET 3.

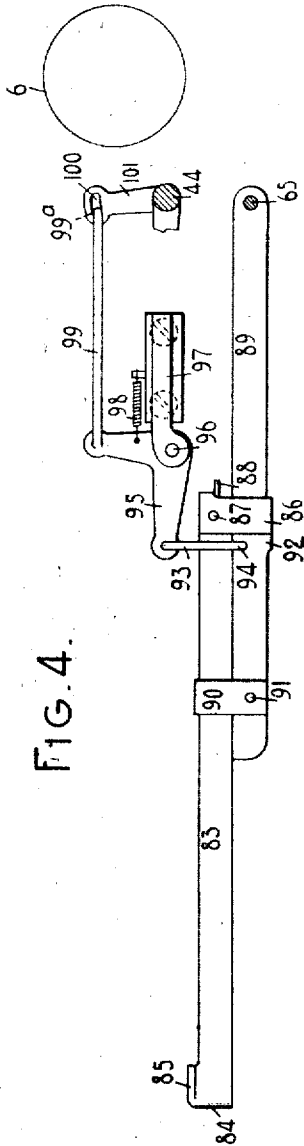
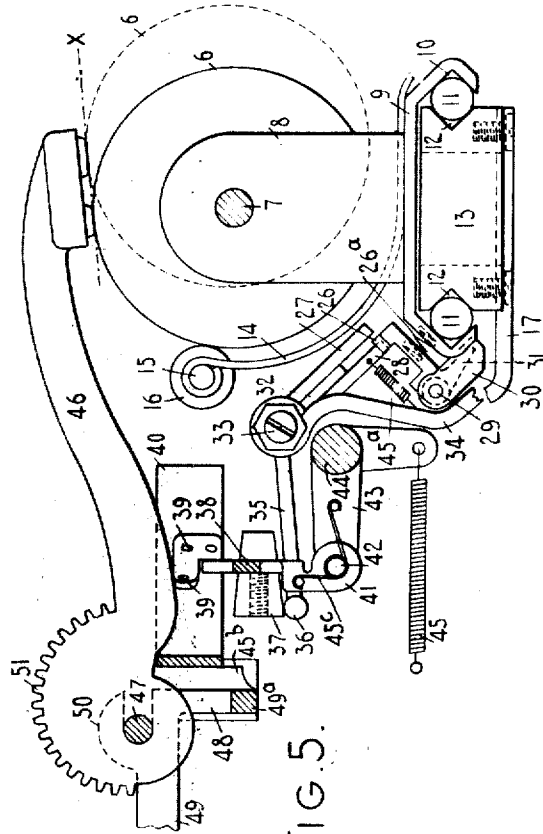


FIG. 4.



565

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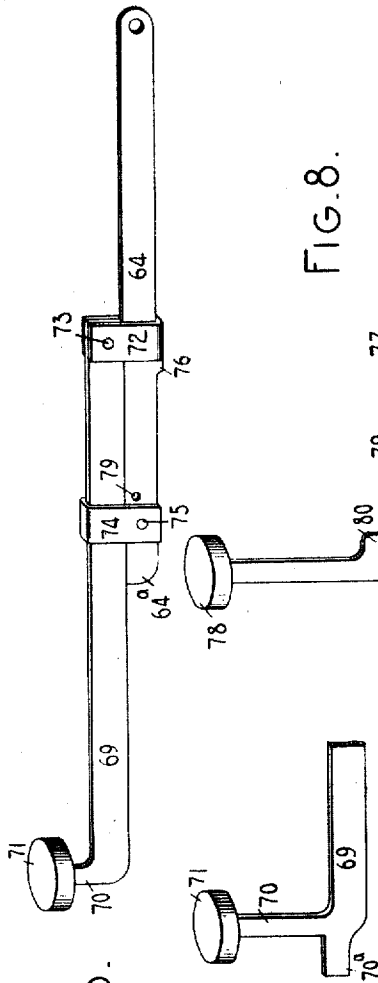


FIG. 6.

FIG. 7.

FIG. 8.

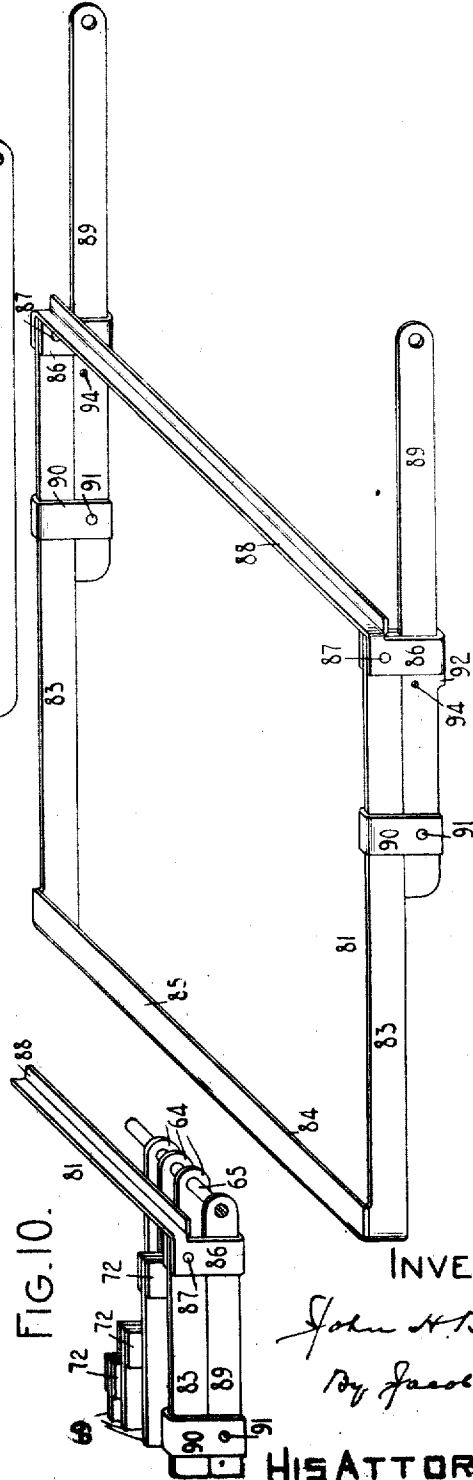


FIG. 10.

FIG. 9.

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UNITED STATES PATENT OFFICE.

JOHN H. BARR, OF NEW YORK, N. Y., ASSIGNOR TO REMINGTON TYPEWRITER COMPANY, OF ILION, NEW YORK, A CORPORATION OF NEW YORK.

TYPE-WRITING MACHINE.

1,267,356.

Specification of Letters Patent.

Patented May 28, 1918.

Application filed August 12, 1915. Serial No. 45,103.

To all whom it may concern:

Be it known that I, JOHN H. BARR, citizen of the United States, and resident of the borough of Manhattan, city of New York, in the county of New York 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 keyboard machines and more particularly to typewriting machines.

One of the main objects of the invention is to produce a machine of the character specified in which a contraction of the keyboard may be readily effected at will, in order to reduce the compass of the machine and thus facilitate packing and transporting or carrying the machine.

A further object of my invention is to provide a comparatively small, cheap and light, yet highly efficient, typewriting machine.

To the above and other ends which will hereinafter appear, my invention consists in the features of construction, arrangements of parts and combinations of devices set forth in the following description and particularly pointed out in the appended claims.

In the accompanying drawings wherein like reference characters indicate corresponding parts in the various views,

Figure 1 is a full sized plan view with parts broken away and parts in section of one form of typewriting machine embodying my invention.

Fig. 2 is a full sized central vertical sectional view of the same showing the machine as the parts appear when the keyboard is contracted.

Fig. 3 is a view corresponding to Fig. 2 but showing the keyboard expanded and ready for use.

Fig. 4 is a detail full-sized side elevation of the space key and some of the associated parts by which the escapement mechanism is controlled.

Fig. 5 is a detail double-sized fragmentary side elevation with parts in section of the escapement mechanism and some of the associated parts; the view showing the parts as they appear when the type bar is in the printing position and the universal bar has been moved thereby to its actuated position.

Fig. 6 is a detail isometric view of one of the two-part key levers carrying a key of the first or foremost bank of keys.

Fig. 7 is a fragmentary perspective view showing the front end portion of one of the key carrying members for the third bank of keys.

Fig. 8 is a detail isometric view of one of the key levers carrying a key of the fourth or last bank of keys.

Fig. 9 is a detail isometric view showing the space key and some of the associated parts.

Fig. 10 is a fragmentary perspective view showing the frame and some of the associated parts.

Fig. 11 is a detail fragmentary perspective view showing portions of one of the side type actions.

In the various views parts have been omitted, only so much of the machine being illustrated as may be deemed necessary to arrive at an understanding of my invention.

The machine as a whole is a so-called portable machine, being devised with a view to providing a small, cheap and light, yet highly efficient machine, which will do the work of a heavier, bulkier and more expensive machine, and in which, moreover, the keyboard may be readily contracted within a small space close to or within the frame, so that the compass or dimensions of the machine as a whole may thus be still further reduced and the machine received within a small case of regular shape and proportions and easily carried or transported.

The main frame is oblong in its general outline and practically all parts of the machine, with the exception of the keys, are contained within the general outline of the frame, and the keys, as indicated above, may be contracted within a comparatively small space adjacent to the frame, as illustrated in Fig. 2.

The frame is designated as a whole by the reference numeral 1 and comprises a front cross plate or casting 2, side plates 3 and a top plate 4. A cross bar 5 is secured at its ends by screws to the side plates and rigidly unites the latter near the rear of the machine.

A rotative platen 6 is supported by its shaft 7 in bearing openings in brackets 8.

The latter are fixed to a substantially C-shaped carriage member 9 formed with race ways 10 for cooperation with anti-friction balls or rollers 11. The balls 11 are likewise received in oppositely disposed bearing grooves 12 formed in a shift, guide or supporting bar or rail 13 on which the carriage is supported for movement from side to side of the machine. The supporting bar 13 for the carriage is mounted for substantially horizontal shifting movement fore and aft of the machine to change the case position of the platen, as will herein-after more clearly appear.

For the purpose of this invention any suitable paper feed mechanism may be employed. In the present instance, I have shown a sheet metal combined paper table and apron 14 which extends beneath the platen between the brackets 8, and up to the front of the platen where it is formed with bearings in which a shaft 15 of a feed roller 16 is supported. The work sheet may, therefore, be introduced into the machine from the rear and beneath the platen, and will be directed around beneath and up and rearwardly over the top of the platen across the printing line, suitable means (not shown) being employed to effect line spacing movements of the platen.

So far as the present invention is concerned, it is immaterial whether the platen be given a case shifting movement or whether or not a relative case shifting movement between the printing instrumentalities and the platen is effected. In the present instance, however, I have shown a shifting platen, the means for supporting and shifting the platen comprising two sheet metal bracket arms 17 which extend forwardly and upwardly from beneath the shift rail 13 at opposite sides of the machine, the shift rail being secured to and supported by these bracket arms. The metal from which each bracket arm 17 is formed is bent at right angles to the plane of the bracket, to form a forwardly extending supporting member 18 substantially parallel with, and adjacent to, a side plate 3 of the frame. Each sheet metal frame, forming a combined bracket 17 and supporting member 18, has a pair of upright parallel links 19 pivoted thereto at 20, one near the front and one near the rear of the machine. The upper ends of each pair of links 19 are pivoted to a side plate of the frame on pivot screws 21, the forward set of links 19 being united by and fixedly connected with an intermediate rock shaft 21'. The platen is thus supported and guided for the case shifting movement fore and aft of the machine, springs 22 tending to return the platen and the parts connected therewith to and hold them in the normal position, and shift keys 23 operating to shift the platen rearwardly to the upper case position. The

shift keys 23 are arranged at the right and left-hand sides of the machine, each key being provided with an L-shaped sheet metal stem 24 which extends through a slot in the front cross plate 2, and is riveted at 25 to an upwardly extending arm 25^a on the associated carrying or shift frame 17—18. The shift mechanism is such that the platen, when shifted from the full line to the dotted line position in Fig. 5, moves at the printing line substantially in an inclined plane indicated by the dotted line *x* in said figure. In other words, the platen moves from the lower to the upper case position upwardly and rearwardly at a slight inclination, so that the extent of printing movement of the type bars will be the same for upper case as for lower case writing, it being understood that the type bars move nearly but not quite through 180° from the normal position shown in Fig. 3 to the printing position shown in Fig. 5.

The carriage is driven by spring means (not shown) and, in the present instance, is controlled in its step-by-step letter feed movement by an escapement mechanism comprising a feed rack 26 cooperative with feed dogs 27 and 28. The feed rack is pivoted at 29 to brackets 30 secured to the member 9 of the carriage. The rack is normally held in operative position for cooperation with the feed dogs by a spring 26^a, being limited in its movement under the power of the spring 26^a by a finger 31 on the rack abutting the member 9 of the carriage. The rack, however, may be turned on its pivot 29 in the opposite direction and against the power of the spring 26^a by suitable releasing mechanism (not shown) to release the rack from the normally engaged dog 27. The feed dogs are mounted on a dog rocker 32 one of the dogs being fixed to or formed as a part of the rocker, the other being a loose dog pivoted to the rocker. The shaft of the dog rocker is pivoted at 33 to bracket arms 34 which are secured at their lower ends to the bottom of the shift rail 13. The dog rocker is thus supported by the shift rail, whereas the feed rack is secured to the carriage, and both the dog rocker and feed rack partake of the case shifting movement of the carriage and platen.

In the present instance, movement is transmitted to the escapement mechanism at each printing operation by the following means:—An arm 35 projects from and is fixed to the shaft of the dog rocker and carries a cylindrical cross head or contact member 36 at the free end thereof. A frusto-conical contact member 37 is fixed to a sheet metal cross bar 38 secured at its ends by rivets 39 to a curved universal bar 40. The cross bar 38 is provided with depending ears 41 pivoted at 42 to crank arms 43. These crank arms project from a rock shaft 44

which extends across the machine and is supported at its ends by bearing screws in the side plates of the frame. The universal bar and the parts connected therewith are returned to normal position by a spring 45 whereas the dog rocker is returned by a spring 45^a. The universal bar bears at the front side thereof against three guide lugs 45^b formed on the forward edge of the type bar segment. A spring 45^c tends to hold the universal bar against the guide lugs 45^b and prevent the universal bar from tilting on the pivots 42.

The same relation is maintained between the universal bar and the type bars irrespective of the case position of the platen, since the universal bar is not moved relatively to the type bars when the platen is shifted. The extent of angular movement of the type bars is the same in printing upper case as in printing lower case by reason of the slight elevation given the platen when it is shifted to the upper case position. It follows, therefore, that the universal bar will be moved the same distance by the type bars in either case position of the platen. However, the dog rocker and the parts carried thereby move slightly upward with the platen when the latter is shifted to the upper case position. It is for this reason that the contact device 37 has its lower contact face inclined to correspond substantially to the inclined shift of the platen, so that the relation between the feed dogs and the feed rack, and between the contact surfaces of the members 36 and 37, will remain the same in either case position of the platen and the uniform movement of the universal bar will in either instance transmit the same extent of movement to the feed dogs. This may better be appreciated when it is observed that the inclination of the lower contact face of the member 37 corresponds to the inclination of the line α in Fig. 5, or is parallel to said line, so that as the member 36 shifts rearwardly and upwardly with the platen, the position of the universal bar relatively to the type bars, and the position of the dogs relatively to the feed rack is not disturbed, and the members 36 and 37 are maintained in contact for transmission of movement from the universal bar to the feed dogs.

The construction illustrated in the present instance provides for the employment of thirty-eight type bars 46, each having two types thereon, and provides for the embodiment of thirty-eight keys in the keyboard, arranged and spaced as are the corresponding keys of the "Universal" or standard keyboard. The four keys for punctuation and special marks sometimes employed at the right-hand side of the keyboard, and the type bars controlled thereby, are omitted in the present construction. The type bars

46 normally rest against a pad 46^a and are pivoted on a curved pivot wire 47, the heel of each bar being received in a saw-kerf 48 formed in a segment 49. A depending flange 49^a is formed on the segment below the portion thereof which is kerfed to receive the type bars, in order to strengthen the segment at this portion of it. The type bars in their normal positions extend longitudinally in lines which radiate approximately from the printing point, and each bar moves to its printing position through more than 90° and approximately through 180°. The pivot wire 47 is received in an opening in a bearing portion 50 of the segment 49 and is arranged in an arc of which the printing point is approximately the center, the actual center being slightly forward of the printing point. The type bars are thus arranged to strike rearwardly and downwardly against the top face of the platen, the type bars moving in radial planes. Geared connections are provided between each type bar and its actuating means. Thus each type bar is provided at the heel thereof with a segmental rack 51 which is eccentric to the pivot of the bar, the distance of the rack teeth from the pivot being greater as the teeth approach the free end of the bar. A companion segmental eccentric rack 52 co-acts with the rack on each type bar, each rack 52 being carried by a sub-lever 53. These sub-levers are of a uniform length and are pivoted on a pivot wire 54 and received in saw-kerfs 55 in a flange 56 on the segment 49. The pivot wire 54 is concentric with the pivot wire 47 and is supported in a bearing opening in the flange 56. The teeth of each rack 52 nearest the attached end of the sector are nearest the pivot of the associated sub-lever, the teeth being at gradually greater distances from the pivot of the sub-lever as the free end of the sector is approached. It will be seen that the sub-levers 53 are levers of the first order and are substantially horizontally disposed, each sub-lever being located beneath its associated type bar and moving in the same radial plane as the associated type bar. The construction, in the present instance, is such that each rack 52 engages the rack on the companion type bar farthest from the pivot of the type bar when the parts are at normal position and gradually approaches the pivot of the bar as the bar moves toward the printing position, thus giving a gradually accelerated movement to the type bar as it approaches the printing point. This provides for an easy start of each type bar, the speed thereof increasing as the bar continues its movement toward the printing point. The segment 49 is provided with laterally extending arms 57 formed with foot pieces 58 by which the segment may be secured by screws 59 to the side plates 3 of 180

the frame. It will be understood that the segmental rack 52 on each sub-lever 53 extends through, and is guided in its movement in, the same saw-kerf 48 that receives the associated type bar. A wire spring 53^a presses upwardly its free end against the forward arm of each sub-lever 53, the rear ends of the springs being connected to the bottom of the segment 49. These springs return the type actions to normal position.

The forward ends of the segmentally arranged sub-levers 53 are disposed in a curve which is concentric with the pivot wires 54 and 47 so that the forward free ends of the sub-levers are nearer the rear of the machine as the sides of the system are approached. The forward end of each sub-lever 53 is pivotally connected to a depending link 60, the lower end of which is pivoted to the forward end of a second sub-lever 61. The sub-levers 61 extend fore and aft of the machine and are pivoted at their forward ends in a straight line extending transversely of the machine on a pivot wire 62, the sub-levers being received and guided in saw-kerfs in the front plate 2 of the machine. The sub-levers 61 are pivoted to move in vertical fore and aft parallel planes and gradually increase in length from the center to the sides of the system, the rear ends of the sub-levers 61 terminating in an arc that corresponds substantially to the arc formed by the forward ends of the sub-levers 53. The construction and arrangement of the parts are such that the plane of movement of each of the sub-levers 61 intersects the converging plane of movement of the associated sub-lever 53. Otherwise stated the plane of movement of each sub-lever 61 is at an angle to the plane of movement of its associated sub-lever 53 and this angle varies depending on the positions of the sub-levers, the angular relation increasing from the center to the sides of the system. Each link 60, which connects an associated pair of sub-levers, may effect such connection at approximately the line of convergence of the planes of movement of said sub-levers, so that movement may be transmitted from each sub-lever 61 to its associated sub-lever 53 without side strain on any of the parts.

Each sub-lever 61 has connected thereto, intermediate its ends, a depending link 63 which extends downwardly to and is connected with a key lever of second order arranged directly beneath and substantially parallel with the associated sub-lever 61. A printing movement of a key lever is operative, therefore, to effect a direct down pull on the associated link 63, the sub-lever 61 and link 60 irrespective of the position of the link 63 lengthwise of the key lever and sub-lever 61. The links 63 for all of the type actions except those for the rear bank of keys are connected to members

64 of two-part key levers or actuating devices. These members 64 are pivoted at their rear ends on a pivot wire 65, each member being received and guided in a saw-kerf 66 in the cross bar 5 which is secured by screws 68 to the side plates of the machine. The key levers are arranged to move in parallel planes, each of which is coincident, or substantially coincident, with the plane of movement of the associated sub-lever 61 although said sub-levers 61 and the key levers extend in opposite directions from their fulcrums. The other member 69 of each two-part lever is formed at its forward end with an upwardly extending key stem 70 provided with a finger key 71. Each member 69 has a sheet metal strap 72 riveted thereto at 73, the strap being substantially U-shaped in cross section and surrounding at the looped portion thereof the other member 64 of the two-part key lever. In a like manner the member 64 has a sheet metal strap 74 riveted thereto at 75 and surrounding the other member 69 of the two-part key lever. In this manner a sliding connection is provided between the members 64 and 69 of each two-part key lever to enable the key carrying members 69 to receive a rectilinear sliding movement fore and aft of the machine on their companion members. A rearward displacement of the key bearing members causes the keys to be moved from operative positions in the keyboard, illustrated in Fig. 3, to a contracted relationship near the front plate of the machine, and to positions where the keys of the several transverse rows are brought together and arranged in overlapping positions as indicated in Fig. 2. It will be seen that when thus positioned a single vertical transverse plane will cut all of the printing keys, whereas when said keys are in their operative positions they occupy different rows which are in different vertical transverse planes. Each member 64 is provided with a downwardly projecting lug 76 on the lower edge thereof for cooperation with the strap 72 on the companion member 69 in order to limit the forward movement of the latter. The members 69 vary in length depending on the position of keys carried thereby in the key-board of the machine. Thus, those members 69 which carry the keys for the first or front row are the longest, the other members being shorter.

The front cross plate 2 of the frame is slotted to receive the key levers and form a guide comb therefor. Not only are the sliding members 69 of the two-part key levers received in the slots in the guide comb but the forward end portion 64^a of each member 64 likewise extends through a slot in the guide comb in order to effectively guide the key levers in their pivotal movements. It will be understood that the friction between the straps 72 and 74 and the members

with which they co-act is sufficient to maintain the sliding members of the key levers in the positions to which they are moved; i. e., either in their operative positions in the keyboard of the machine or in the contracted relation illustrated in Fig. 2.

The two-part key levers hereinbefore described are employed for the first three banks of keys, whereas the key levers 77 for the fourth bank of keys, or that nearest the frame of the machine are constructed as represented in Fig. 8. Each lever 77 is preferably a single piece key lever of the character shown; is provided with a finger key 78 and is connected at 79 to the associated pull link 63 by which connection is effected with the companion sub-lever 61. Each key lever 77 is also provided with an enlarged portion 80 which is received in a guide opening in the front cross plate 2 of the machine in order to effectively guide the key lever in its pivotal movement. All of the key levers, both single piece and two-part key levers, are pivoted on the pivot rod or wire 65 and are received and guided in saw-kerfs 66 in the cross bar 5. The levers 77 are made as single piece key levers because it is unnecessary to shift the keys of this bank in the keyboard; they being as close to the frame of the machine as it is feasible to position them. It will be understood, however, that if deemed necessary the key levers carrying the keys 78 may be formed as two-part key levers like those previously described.

I have provided means whereby the keyboard, by a single operation, may be collapsed and the keys brought into the contracted relationship represented in Fig. 2, or the keys may by a single operation be moved from the positions represented in Fig. 2 to their respective operative positions in the keyboard of the machine, as illustrated in Fig. 3. The means in question in the present instance comprises a rectangular sheet metal frame designated as a whole by the reference numeral 81 and illustrated in detail in Fig. 9. This frame is mounted like the two-part key levers to receive a sliding movement fore and aft of the machine and also to receive a pivotal movement around the pivot rod 65. The rectangular frame comprises side members 83 formed with a front cross bar 84 bent over on itself to form a space key 85. The side members 83 of the frame have straps 86 riveted thereto at 87, said straps being formed as a part of a rear angular cross bar 88 which connects the sides of the frame at the rear ends thereof. Lever arms 89 are pivoted on the rod 65 and are received in the straps 86 on the frame 81. Each lever arm has a strap 90 riveted thereto at 91, the looped portion of each strap 90 surrounding the associated side bar 83 of the rectangular frame, and affording a

fore and aft sliding movement of the frame on the lever arms 89 and a pivotal movement with said arms. From an inspection of Figs. 2 and 3 it will be understood that the rear edge of the space key 85 is adapted to co-act with the key stems 70 of the first two banks of keys, and with projections 70* on the stems of the third bank of keys, as the frame 81 slides rearwardly from the position indicated in Fig. 3 to that indicated in Fig. 2. It will be understood, moreover, that the cross bar 84—85 in its rearward movement takes up the members 69 of the first three rows of keys successively and moves them relatively to each other, and at the termination of the rearward movement of the frame the body portions of the members 69 will be contained within the frame of the machine and the keys will be grouped in overlapping positions beneath the last row of keys 78 and in the contracted relation shown in Fig. 2. At this time the rear ends of the sliding members 69 for the different banks of keys will be in a staggered relation, as illustrated in Fig. 10. In this view I have shown one key lever for each of the first three banks of keys. When the rectangular frame 81 is moved forward from the position shown in Fig. 2 to that illustrated in Fig. 3, the cross bar 88 will coact successively with the rear ends of the members 69 of the two-part levers (see Fig. 10) and will move said members forward until they are arrested by the lugs 76. At this time the rear ends of all of the members 69 will be alined across the machine, as shown in Figs. 1 and 3, and the keys will have been brought to their respective positions in the keyboard of the machine, as illustrated in these figures. In this forward movement of the rectangular frame the cross bar 88 will be brought successively into cooperation with the rear ends of the members 69 for the keys of the first three banks, the longest members 69 for the first bank of keys being taken up first by the cross bar, the next longest members for the second bank of keys being taken up next, and the shortest members for the third bank of keys being taken up last, and all of the keys, and the parts which carry them, being moved to their respective positions in the keyboard of the machine by a single forward movement of the frame 81. When the keys are thus moved to the separated or expanded relationship, and to their operative positions in the keyboard, the rectangular frame is limited by the cooperation of its straps 86 with lugs 92 formed on the lever arms 89, and the parts will appear as represented in Figs. 1 and 3, the rear ends of all of the sliding members 69 being in alinement adjacent to the cross bar 88.

The rear edge of the front cross bar 84—85 is the only effective portion thereof which

is operative on the key carrying members to shift them. From certain aspects this may be regarded as a cross bar irrespective of whether or not it also carries a space key or is extended forwardly far enough to form a space key.

In order that a pivotal movement of the space key 85 may bring about an operation of the escapement mechanism, operative connection between the space key and the escapement is effected by the following means:—

From an inspection of Figs. 4 and 9 it will be seen that a link 93 is connected at 94 to each of the lever arms 89 so that the links do not interfere with the sliding movement of the frame 81. Each link 93 is also connected to a bell crank lever 95 pivoted at 96 to a hanger 97 secured by screws to a side plate of the machine. Suitable returning springs, as indicated at 98 for example, may be connected to the bell crank levers to return them and the parts connected therewith to normal position. Each bell crank lever 95 has a link 99 connected at one end thereto, the opposite bent end 99^a of the link being received in a slot 100 in a crank arm 101. These crank arms project upwardly from the rock shaft 44 by which motion is transmitted to the dog rocker. It will be seen that in the normal positions of the parts the bent ends 99^a of the links 99 are positioned in the forward ends of the slots 100, so that a depression of the space key is effective to rock the shaft 44 and actuate the dog rocker. It will also be understood that when the rock shaft 44 is actuated through the universal bar, by the movement of the type bar to the printing position, the arms 101 will be moved forwardly without transmitting movement to the links 99 and the space key connected therewith, a lost motion between the arms 101 and the links 99 taking place at this time.

Any suitable ribbon mechanism may be employed, only a part of one form of such mechanism being shown in the present instance, in order to illustrate the general relation of such mechanism to other parts of the machine. The cross bar 5 carries bracket arms 102 from which upwardly extending spindles 103 project. These spindles also project through bearing openings in arms 104 formed on the segment 49. Ribbon spools 105 are supported on the spindles 103 and are driven by suitable mechanism, not shown. The ribbon 106 extends across the machine from one spool to the other, being threaded through a suitable guide 107 by which it is presented at the printing point.

A type guide 108 may be employed for co-operation with the type bars. This guide is formed as a part of arms 109, which are fixed to the segment 49 by screws 110.

The construction and arrangement of the

parts of the type actions of my present invention are such that I not only provide a gradual acceleration in the movement of each type bar as it approaches the printing position, and avoid all side strain on the type actions throughout the system, but I likewise provide a uniform leverage and "touch" throughout the system, and a uniform dip of all of the keys. Thus, the links 63 throughout the system are connected at different distances from the fulcrums of the sub-levers 61, and at different distances from the fulcrums of the key levers, depending on the lengths of the sub-levers 61 and the key levers which are connected by said links. I have attempted to illustrate this variation in the points of connection of the link 63 at the left-hand side of Fig. 1. In order to avoid confusion in the showing, I have illustrated only five of the links 63; those which are connected to the key levers of the first five keys from the left in the first row or bank, and to the corresponding sub-levers 61. It will be seen that these links are connected to their associated levers at gradually increasing distances from the front of the machine, and from the fulcrum or pivot rod 62, as the left-hand side of the system is approached, and as the sub-levers 61 become progressively longer. The points of connection of the links 63 are also determined by the lengths of the key levers, compensation being made for the variation in the lengths of the key levers as well as the sub-lever 61. The difference in the points of connection to compensate for the difference in length of the key levers is slight and does not clearly appear in Fig. 1, since the links 63 there shown are all connected to key levers of the same length. It will be understood, however, that compensation is made for the difference in length of the key levers, as well as for the difference in length of the sub-levers 61, by regulating the points of connection of the links 63 with their respective key levers and sub-levers 61. A uniform leverage and "touch", and a uniform extent of dip of the keys is thus provided throughout the system and an efficient type action produced which affords an easy start of the type bar and effects a gradual acceleration thereof as it approaches the printing position. The machine as a whole is small and of an outline which enables it to be conveniently packed and carried or transported, Fig. 2 showing the actual length and height of the machine when ready to be packed and transported. The frame of the machine terminates in the rear of the keyboard and the construction is such that when the keyboard is eliminated, collapsed, or contracted close to the frame of the machine, there are but few parts which extend beyond the general rectangular outline of the frame, and this to no material extent. The machine may,

therefore, be received in a comparatively small oblong carrying case of regular outline and convenient form.

While I prefer to employ type actions such as those disclosed herein, from certain aspects of my invention it is immaterial what character of actuating and printing devices are controlled by the two-part key levers or actuating devices. Then, again, from certain other aspects of the invention, it is immaterial what character of key levers, or key carrying members, are employed to actuate the type actions, and whether or not a collapsible keyboard is employed.

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

1. In a typewriting or like machine having a keyboard, the combination of printing instrumentalities controlled by keys in the keyboard of the machine, and means which enable the different transverse rows of keys which when in use are cut by vertical parallel transverse planes to be moved relatively to each other so that a single vertical transverse plane will cut said keys.

2. The combination of a type bar, a two-part key lever, one member of which carries a key and is adapted to slide therewith on the other member from its position in the keyboard to an inoperative position, and constantly maintained intermediate actuating connections between said other member of the two-part lever and the type bar.

3. The combination of printing instrumentalities, and two-part key actuated devices therefor, one member of each key actuated device carrying a key and being movable on its companion member to enable the keys to be moved from their operative positions in the keyboard into a contracted relationship, said key carrying members varying in length according to operative positions of their keys in the keyboard of the machine.

4. The combination of a carriage, printing keys movable into and out of operative position in the keyboard of the machine, a frame mounted for sliding and for pivotal movement and operative to move the printing keys out of operation, a space key carried by said frame, and means for effecting a letter space movement of the carriage by a pivotal movement of said frame.

5. The combination of a type bar, a two-part key lever, one member of which carries a key and is adapted to slide therewith on the other member from its position in the keyboard to an inoperative position, and intermediate connections between said two-part lever and the type, said connections including a link connected to said other member of the two-part lever, and a sub-lever connected to said link.

6. The combination of printing instrumentalities, two-part key actuated devices, therefor, one member of each key actuated

device carrying a key and being movable on its companion member to enable the keys to be moved from their operative positions in different banks in the keyboard into a contracted relationship, said key carrying members varying in length according to operative positions of their keys in the keyboard of the machine, and a shifting device which co-acts with said key-carrying members to take up and move successively those having keys for different banks.

7. The combination of a carriage, printing keys movable into and out of operative position in the keyboard of the machine, a frame mounted for sliding and for pivotal movement and effective by a single sliding movement to move said printing keys to their respective positions in the keyboard, a space key carried by said frame, and means controlled by a pivotal movement of said frame for affording a letter space movement of the carriage.

8. The combination of a type bar, a two-part key lever, one member of which carries a key and is adapted to slide therewith on the other member from its position in the keyboard to an inoperative position, intermediate connections between said two-part lever and the type bar, said connections including a link connected to said other member of the two-part lever, a sub-lever connected to said link, and a second sub-lever operatively connected to said first mentioned sub-lever and to the type bar.

9. The combination of printing instrumentalities, two-part key actuated devices therefor, one member of each key actuated device carrying a key and being movable on its companion member to enable the keys to be moved from their operative positions in the keyboard into a contracted relationship, said key carrying members varying in length according to operative positions of their keys in the keyboard of the machine, and a shifting device which co-acts with said key carrying members to take up successively those members having keys for different banks and move them, said shifting device co-acting in its movements in both directions with said key carrying members, the movement of the shifting device in one direction bringing the keys into contracted relationship, and the movement of the shifting device in the opposite direction positioning the keys in their respective banks in the keyboard.

10. The combination of printing instrumentalities, two-part key actuated devices therefor, one member of each key actuated device carrying a key and being movable on its companion member to enable the keys to be moved from their operative positions in the keyboard into a contracted relationship, said key carrying members varying in length according to operative positions of their keys

- in the keyboard of the machine, a cross bar which co-acts with the forward ends of said key carrying members to take up successively those members having keys in different banks and shift them rearwardly and effect a contracted relationship of the keys, a second cross-bar which co-acts with the rear ends of said key carrying members and takes up successively those members having keys for different banks and shifts them forwardly to bring the different keys in their respective banks in the keyboard of the machine, connections between said cross bars to cause them to move together, and a space key formed as part of one of said bars.
15. A series of two-part key levers, each lever comprising one member within the frame of the machine and a second key carrying member carried by the first mentioned member and movable thereon from its position in the keyboard into the frame of the machine to an extent which will bring the associated key adjacent to the frame; and means which by a single operation is effective to move all of said key carrying members to bring the keys thereon adjacent to the frame of the machine.
16. The combination of printing instrumentalities, two-part key actuated devices therefor, one member of each key actuated device carrying a key and being movable on its companion member to enable the keys to be moved from their operative positions in the keyboard into a contracted relationship, said key carrying members varying in length according to operative positions of their keys in the keyboard of the machine, a cross-bar which co-acts with said key carrying members to take up successively those members having keys for different banks and shift them, and means by which said cross-bar may be shifted at will.
17. The combination with the frame of the machine which terminates in the rear of the keyboard, printing instrumentalities, key carrying members for actuating said printing instrumentalities, said members being supported wholly from within the frame of the machine and movable from their respective positions in the keyboard into the frame to bring the keys close to the frame and thus eliminate the keyboard and reduce the dimensions of the machine, a space key movable into and out of operative position and toward and away from the key carrying members and operative by such movements to move said key carrying members into and out of operative position, the movement of the space key toward the frame of the machine moving said key carrying members out of operative position in the keyboard and the movement of the space key away from the frame of the machine moving said key carrying members and the keys carried thereby into their respective positions in the keyboard.
18. In a typewriting or-like machine, the combination of printing instrumentalities, a keyboard the keys of which control said printing instrumentalities, the frame of the machine which terminates in the rear of the
1. in the keyboard of the machine, a cross bar which co-acts with the forward ends of said key carrying members to take up successively those members having keys in different banks and shift them rearwardly and effect a contracted relationship of the keys, a second cross-bar which co-acts with the rear ends of said key carrying members and takes up successively those members having keys for different banks and shifts them forwardly to bring the different keys in their respective banks in the keyboard of the machine, connections between said cross bars to cause them to move together, and a space key formed as part of one of said bars.
 2. 15. A series of two-part key levers, each lever comprising one member within the frame of the machine and a second key carrying member carried by the first mentioned member and movable thereon from its position in the keyboard into the frame of the machine to an extent which will bring the associated key adjacent to the frame; and means which by a single operation is effective to move all of said key carrying members to bring the keys thereon adjacent to the frame of the machine.
 3. 16. The combination of printing instrumentalities, two-part key actuated devices therefor, one member of each key actuated device carrying a key and being movable on its companion member to enable the keys to be moved from their operative positions in the keyboard into a contracted relationship, said key carrying members varying in length according to operative positions of their keys in the keyboard of the machine, a cross-bar which co-acts with said key carrying members to take up successively those members having keys for different banks and shift them, and means by which said cross-bar may be shifted at will.
 4. 17. The combination with the frame of the machine which terminates in the rear of the keyboard, printing instrumentalities, key carrying members for actuating said printing instrumentalities, said members being supported wholly from within the frame of the machine and movable from their respective positions in the keyboard into the frame to bring the keys close to the frame and thus eliminate the keyboard and reduce the dimensions of the machine, a space key movable into and out of operative position and toward and away from the key carrying members and operative by such movements to move said key carrying members into and out of operative position, the movement of the space key toward the frame of the machine moving said key carrying members out of operative position in the keyboard and the movement of the space key away from the frame of the machine moving said key carrying members and the keys carried thereby into their respective positions in the keyboard.
 5. 18. In a typewriting or-like machine, the combination of printing instrumentalities, a keyboard the keys of which control said printing instrumentalities, the frame of the machine which terminates in the rear of the

keyboard, and means which enable the keyboard to be contracted adjacent to the frame of the machine.

19. The combination of type bars and actuating means therefor including keys arranged in banks, means which enable the keys forward of the last bank to be moved from their respective positions in the keyboard to positions beneath the last bank of keys, and means for thus moving the movable keys at a single operation.

20. A series of two-part key levers, each lever comprising one member within the frame of the machine and a second key carrying member carried by the first mentioned member and movable thereon from its position in the keyboard into the frame of the machine to an extent which will bring the associated key adjacent to the frame; and means which by a single operation is effective to move all of said key carrying members to bring the keys thereon adjacent to the frame of the machine or to return the keys to their respective positions in the keyboard.

21. The combination of printing instrumentalities, two-part key actuated devices therefor, one member of each key actuated device carrying a key and being movable on its companion member to enable the keys to be moved from their operative positions in the keyboard into a contracted relationship, said key carrying members varying in length according to operative positions of their keys in the keyboard of the machine, a cross-bar which co-acts with said key-carrying members to take up successively those members having keys for different banks and shift them, and a space key connected with said cross-bar and by which the latter may be shifted at will.

22. The combination with the frame of the machine which terminates in the rear of the keyboard, of key carrying members supported wholly from within the frame of the machine and movable from their respective positions in the keyboard into the frame to an extent sufficient to bring the keys close to the frame and thus eliminate the keyboard and reduce the dimensions of the machine, and a movable transverse bar supported wholly from within the frame of the machine and cooperative with all of said key carrying members to move them, said transverse bar forming a space key.

23. The combination of type bars, actuating means therefor including keys arranged in banks, means which enable the keys forward of the last bank to be moved from their respective positions in the keyboard to positions beneath the last bank of keys, and means effective at a single operation to return said movable keys to their respective positions in the keyboard.

24. The combination with the frame of the machine which terminates in the rear of the

keyboard, key carrying members supported wholly from within the frame of the machine and movable from their respective positions in the keyboard into the frame a distance sufficient to bring the keys close to the frame and thus eliminate the keyboard and reduce the dimensions of the machine, and a transverse bar supported wholly from within the frame of the machine and movable into and out of contact with and operative on all of said movable carrying members to move them.

25. The combination with the frame of the machine which terminates in the rear of the keyboard, key carrying members supported wholly from within the frame of the machine and movable from their respective positions in the keyboard into the frame a distance sufficient to bring the keys close to the frame and thus eliminate the keyboard and reduce the dimensions of the machine, a movable transverse bar supported wholly from within the frame of the machine and cooperative with all of said key carrying members to move them into the frame of the machine to eliminate the keyboard, said bar forming a space key, and a second transverse movable bar cooperative with said key carrying members to move them and the keys carried thereby into their respective positions in the keyboard.

26. In a typewriting or like machine, the combination of a keyboard, printing instrumentalities controlled by the keys thereof, the frame of the machine which terminates in the rear of the keyboard, and means which enable keys of the keyboard to slide relatively one to another fore and aft of the machine from their operative positions to contract the keyboard adjacent to the frame of the machine.

27. The combination with the frame of the machine which terminates in the rear of the keyboard, and key carrying members carrying keys arranged in different banks in the keyboard and supported wholly from within the frame of the machine and relatively movable from their respective positions in different banks in the keyboard into the frame a distance sufficient to contact the keyboard and bring the keys close to the frame and thus eliminate the keyboard and reduce the dimensions of the machine.

28. The combination with the frame of the machine which terminates in the rear of the keyboard, key carrying members supported wholly from within the frame of the machine and movable from their respective positions in the keyboard into the frame a distance sufficient to bring the keys close to the frame and thus eliminate the keyboard and reduce the dimensions of the machine, a transverse bar supported wholly from within the frame of the machine and movable relatively to and cooperative with

all of said key carrying members to move them into the frame of the machine to eliminate the keyboard, and a second transverse movable bar cooperative with said key carrying members to move them and the keys carried thereby into their respective positions in the keyboard.

29. The combination with the frame of the machine which terminates in the rear of the keyboard, printing instrumentalities, key carrying members for actuating said printing instrumentalities, said members being supported wholly from within the frame of the machine and movable from their respective positions in the keyboard into the frame a distance sufficient to bring the keys close to the frame and thus eliminate the keyboard and reduce the dimensions of the machine, and a space key movable into and out of operative position and into and out of contact with said key carrying members and operative to move said key controlled members.

30. A series of two-part key levers, each lever comprising one member within the frame of the machine and a second key carrying member carried by the first mentioned member and movable thereon from its position in the keyboard into the frame of the machine to an extent which will bring the associated key adjacent to the frame, and printing instrumentalities controlled by said key levers.

31. The combination with the frame of the machine which terminates in the rear of the keyboard, key carrying members supported wholly from within the frame of the machine and movable relatively one to another from their respective positions in the keyboard into the frame a distance sufficient to bring the keys close to the frame and thus eliminate the keyboard and reduce the dimensions of the machine, and means by which the movement of one of said keys is effective to move the remainder of said key carrying members, and bring the keys close to the frame of the machine.

32. The combination of a series of type bars pivoted in a curved line, a series of sub-levers of a uniform length pivoted in a curved line and operatively connected with said type bars, a second series of sub-levers pivoted in a straight line and increasing in length from the center to the sides of the system, a curved series of links connecting the sub-levers of the two series, a series of key levers, and links between said key levers and the second series of sub-levers.

33. In a top-strike machine, the combination of a downwardly striking type bar, a substantially horizontally disposed sub-lever the plane of movement of which is substantially coincident with the plane of movement of the type bar, a second sub-lever the plane of movement of which is at an angle to the

plane of movement of the first mentioned sub-lever, a link directly connecting said sub-levers, and a key lever connected with said second sub-lever.

34. The combination of a series of type bars which move in converging planes, each of the type bars having an eccentric rack thereon, a series of radially arranged sub-levers which move in converging planes corresponding substantially to the planes of movement of the type bars, each sub-lever having an eccentric rack which meshes with the rack of the associated type bar, a second set of sub-levers which move in parallel planes, link connections between the sub-levers of the two series, each of said links extending at substantially right angles to the associated pair of sub-levers which it connects, and key-actuated devices operatively connected with the sub-levers of the second series.

35. The combination of a type bar that moves through substantially 180°, a sub-lever geared to said type bar and the plane of movement of which is substantially coincident with the plane of movement of the type bar, a second sub-lever the plane of movement of which is at an angle to the plane of movement of the first mentioned sub-lever, a link connecting said sub-levers, said link being connected at one end to one of said sub-levers and at its other end to the other sub-lever, and a key lever connected with said second sub-lever.

36. The combination of a series of type bars which move in converging planes, each of the type bars having an eccentric rack thereon, a series of radially arranged sub-levers which move in converging planes corresponding substantially to the planes of movement of the type bars, each sub-lever having an eccentric rack which meshes with the rack of the associated type bar, a second set of sub-levers which move in parallel planes, said sub-levers of the second series being pivoted in a straight line which extends transversely across the machine and increasing in length from the center to the sides of the system, links which connect the sub-levers of the two series, key levers, and links which connect said key levers with the sub-levers of the second series.

37. The combination of a type bar, a sub-lever of the first order having a plane of movement which is substantially coincident with the plane of movement of the type bar and is operatively connected with said type bar, a second sub-lever fulcrumed near one end and having a plane of movement which is at an angle to the plane of movement of the first mentioned sub-lever, a link between said sub-levers and connected at each end to one of said sub-levers and supported wholly by said sub-levers, a key lever of the second order having a plane of movement substan-

tially coincident with that of the second sub-lever, and a link between said key-lever and the second sub-lever.

38. The combination of a series of segmentally arranged type bars, a series of substantially horizontally disposed segmentally arranged sub-levers each of which has a plane of movement substantially coincident with the plane of movement of and directly engages the associated type bar, a second series of parallel sub-levers, links directly connecting the sub-levers of the two series, and extending at substantially right angles to said sub-levers, a series of key levers, and links connecting said key levers and the second series of sub-levers.

39. The combination of a series of type bars, a series of segmentally arranged sub-levers each of which has a plane of movement substantially coincident with that of the associated type bar, a second series of parallel sub-levers fulcrumed in a straight line and varying in length, links each directly connecting a companion pair of sub-levers of the two series, key levers which extend fore and aft of the machine in parallel planes, and links between said second series of sub-levers and the key levers.

40. The combination of a platen, a series of segmentally arranged type bars that strike against the upper face of the platen and move through more than 90° , a series of sub-levers, geared connections between said type bars and sub-levers, a second series of sub-levers, links each of which directly connects a companion pair of sub-levers of the two series, each link being guided by its connected sub-levers, key levers substantially parallel with the sub-levers of the second series, and links intermediate said key levers and the sub-levers of the second series.

41. The combination of a series of type bars that move in converging planes, a series of sub-levers of the first order that move in corresponding converging planes, and which are operatively connected with the type bars, a second series of parallel sub-levers which move in planes that intersect the converging planes of movement of the sub-levers of the first series at varying angles from the center to the sides of the system, and extend to the lines of intersection of said planes, links intermediate said sub-levers of the two series and each of which connects the associated pairs of sub-levers at the line of intersection of their planes of movement, key levers which are substantially parallel with the sub-levers of the second series, and links between said last mentioned sub-levers and the key levers.

42. The combination of a series of type bars that move in converging planes, a series of substantially horizontally disposed sub-levers of the first order that move in corresponding converging planes and which are

operatively connected with the type bars, a second series of substantially horizontally disposed parallel sub-levers which extend fore and aft of the machine and move in planes that intersect the converging planes of movement of the sub-levers of the first series at varying angles from the center to the sides of the system, the sub-levers of the second series being pivoted at their front ends in a straight line extending transversely across the machine and projecting gradually increasing distances from their pivots as the sides of the machine are approached, pull links intermediate said sub-levers of the two series, key levers which are substantially parallel with the sub-levers of the second series, and pull links between said last mentioned sub-levers and the key levers.

43. The combination of a type bar having a movement of over 90° , a sub-lever of the first order geared to said type bar and having a plane of movement which is substantially coincident with the plane of movement of the type bar, a second sub-lever fulcrumed near one end having a plane of movement which is at an angle to and intersects the plane of movement of the first mentioned sub-lever, a link between said sub-levers at the line where their planes of movement intersect, a key lever of the second order having a plane of movement substantially coincident with that of the second sub-lever, and a link between said key lever and the second sub-lever.

44. The combination of a platen, a series of segmentally arranged type bars that strike against the top face of the platen, a series of substantially horizontally disposed sub-levers, each of said sub-levers moving in substantially the same plane as its associated type bar, a second series of substantially horizontally disposed parallel sub-levers, links connecting the sub-levers of the two series, key levers, and links intermediate the key levers and said second series of sub-levers.

45. The combination of a type bar that moves through substantially 180° , a substantially horizontally disposed sub-lever geared to said type bar and the plane of movement of which is substantially coincident with the plane of movement of the type bar, a second substantially horizontally disposed sub-lever the plane of movement of which is at an angle to the plane of movement of the first mentioned sub-lever, a link connecting said sub-levers, a key lever, and a link connecting said second sub-lever with said key lever.

46. The combination of a series of segmentally arranged type bars which in their normal positions extend longitudinally in radial lines substantially from the printing point and move through more than 90° , a

series of sub-levers each of which moves in a radial plane substantially coincident with the plane of movement of the associated type bar, a second series of parallel sub-levers which extend fore and aft of the machine and increase in length from the center to the sides of the system, links directly connecting the sub-levers of the two series, a series of key levers, and links connecting said key levers and the second series of sub-levers.

47. The combination of a key lever; a type bar; and intermediate actuating connections between the key lever and type bar, said connections including two sub-levers each of which moves in a single plane, the plane of movement of one of said sub-levers converging with the plane of movement of the other of said sub-levers, one sub-lever being substantially horizontally disposed and connected directly with the type bar and the other being connected with the key lever, the last mentioned sub-lever extending from its fulcrum to the intersecting plane of the other sub-lever, and links which connect said sub-levers.

48. The combination of a type bar, a substantially horizontally disposed sub-lever the plane of movement of which is substantially coincident with the plane of movement and which is directly connected with the type bar, a second sub-lever the plane of movement of which is at an angle to and intersects the plane of movement of the first mentioned sub-lever, said second sub-lever extending to the line of intersection of said planes, a link connecting said sub-levers at the said line of intersection of the planes, and a key lever connected with said second sub-lever and the plane of movement of which is substantially coincident with the plane of movement of the second sub-lever.

49. The combination of a platen, a series of segmentally arranged type bars that strike against the top face of the platen, a series of substantially horizontally disposed radially arranged sub-levers, each of said sub-levers moving in substantially the same plane as its associated type bar, a second series of substantially horizontally disposed parallel sub-levers that extend fore and aft of the machine and terminate at their rear ends at progressively greater distances from the front of the machine as the sides of the system of sub-levers are approached, links connecting the sub-levers of the two series, key levers, and links intermediate the key levers and said second series of sub-levers.

50. The combination of a series of type bars that move in converging planes, a series of sub-levers of the first order that move in corresponding converging planes, and which are operatively connected with the type bars, a second series of parallel sub-levers which move in planes that intersect the converging planes of movement of the sub-levers of the

first series at varying angles from the center to the sides of the system, the sub-levers of the second series being pivoted at their front ends in a straight line extending transversely across the machine and projecting gradually increasing distances from their pivots as the sides of the machine are approached, links intermediate said sub-levers of the two series, key levers which are substantially parallel with the sub-levers of the second series, and links between said last mentioned sub-levers and the key levers.

51. The combination of a platen, a series of segmentally arranged type bars that strike against the top face of the platen and move through more than 90°, a series of radially disposed substantially horizontally arranged sub-levers, each of said sub-levers moving in a plane substantially coincident with the plane of movement of the associated type bar, a second series of parallel substantially horizontally disposed sub-levers pivoted at their forward ends in a straight line, operative connections between the sub-levers of the two series, and key actuated devices operatively connected with said sub-levers of the second series.

52. The combination of a series of type bars that move in converging planes, a series of substantially horizontally disposed sub-levers of the first order that move in corresponding converging planes, and which are operatively connected with the type bars, a second series of substantially horizontally disposed parallel sub-levers which extend fore and aft of the machine and move in planes that intersect the converging planes of movement of the sub-levers of the first series at varying angles from the center to the sides of the system, pull links which connect said sub-levers of the two series, key levers which are substantially parallel with the sub-levers of the second series, and pull links between said last mentioned sub-levers and the key levers.

53. The combination of a type bar, a substantially horizontally disposed sub-lever the plane of movement of which is substantially coincident with the plane of movement of the type bar, a second substantially horizontally disposed sub-lever the plane of movement of which is at an angle to the plane of movement of the first mentioned sub-lever, a link connecting said sub-levers, a key lever, and a link connecting said second sub-lever with said key lever.

54. The combination of a series of two-part actuating devices, one part of each of said devices being a key bearing member carried by and movable along its associate part, the movements of such key bearing members being such as to effect a contraction and expansion of the keyboard, and a single means for moving all of said key bearing members.

55. In a typewriting machine, the combination of a series of segmentally arranged pivoted type bars, a series of radially arranged sub-levers operatively connected therewith, a second series of parallel sub-levers operatively connected to the first mentioned sub-levers, a series of parallel key levers, the sub-levers of the second series and said key levers projecting in opposite directions from their fulcrums, and intermediate links between said key levers and the sub-levers of the second series, said links being variably positioned from the center to the sides of the system with reference to fulcrums of levers to which they are connected.

56. In a typewriting machine, the combination of a series of segmentally arranged pivoted type bars, a series of radially arranged sub-levers operatively connected therewith, a second series of parallel sub-levers which vary in length from the center to the sides of the system and which are operatively connected to the first mentioned sub-levers, a series of key levers substantially parallel with the parallel sub-levers, the sub-levers of the second series and said key levers projecting in opposite directions from their fulcrums, and intermediate links between said key levers and the sub-levers of the second series, said links being variably positioned from the center to the sides of the system with reference to fulcrums of levers to which they are connected.

57. In a typewriting machine, the combination of a series of type bars, a series of sub-levers which move in converging planes and are operatively connected to the type bars, a second series of sub-levers which move in parallel planes that intersect the planes of movement of the sub-levers of the first mentioned series and extend gradually increasing distances from their fulcrums as the sides of the system are approached, means for connecting the sub-levers of the two series, key levers, the key levers and parallel sub-levers extending from their fulcrums in opposite directions, and links which connect said key levers and parallel sub-levers at varying distances from their fulcrums depending on the length of the parallel sub-levers to which the links are connected.

58. In a typewriting machine, the combination of a series of type bars, a series of sub-levers which move in converging planes and are operatively connected to the type bars, a second series of sub-levers which move in parallel planes that intersect the planes of movement of the sub-levers of the first mentioned series and extend gradually increasing distances from their fulcrums as the sides of the system are approached, links which connect the respective sub-levers of the two series at points where their planes intersect, key levers substantially parallel

with said parallel sub-levers, the key levers and parallel sub-levers extending from their fulcrums in opposite directions, and links which connect said key levers and parallel sub-levers at varying distances from their fulcrums depending on the length of the parallel sub-levers to which the links are connected.

59. In a typewriting machine, the combination of a series of segmentally arranged pivoted type bars, a series of radially arranged sub-levers operatively connected therewith, a second series of parallel sub-levers which vary in length from the center to the sides of the system and are operatively connected to the first mentioned sub-levers, a series of parallel key levers which vary in length, the sub-levers of the second series and said key levers projecting in opposite directions from their fulcrums, and intermediate links between said key levers and the sub-levers of the second series, said links being variably positioned from the center to the sides of the systems with reference to fulcrums of levers to which they are connected to compensate for the variation in the length of the parallel sub-levers and the key levers and provide a uniform leverage and dip of the keys throughout the system.

60. In a typewriting machine, the combination of a series of type bars, a series of sub-levers of uniform length which move in converging planes and are operatively connected to the type bars, a second series of sub-levers which move in parallel planes that intersect the planes of movement of the sub-levers of the first mentioned series and extend gradually increasing distances from their fulcrums as the sides of the system are approached, means for connecting the sub-levers of the two series, key levers which vary in length, the key levers and parallel sub-levers extending from their fulcrums in opposite directions, and links which connect said key levers and parallel sub-levers at varying distances from their fulcrums depending on the length of the parallel sub-levers and key levers to which the links are connected, whereby a uniform leverage and dip of the keys throughout the system is provided.

61. The combination of printing instrumentalities, and two-part key levers therefor, one member of each two-part key lever carrying a key and being movable on its companion member to enable the keys to be moved from their operative positions in the keyboard into a contracted relationship one with reference to another, said key carrying members varying in length according to the operative positions of their keys in the keyboard of the machine.

62. The combination with the frame of the machine which terminates in its entirety

in the rear of the keyboard when the latter is in its extended or operative position, printing instrumentalities, of key carrying members for actuating said printing instrumentalities, said members being supported wholly from within the frame of the machine and movable relatively one to another from their respective positions in the keyboard back toward the frame of the machine and thus reduce the dimensions of the machine, a space key movable into and out of operative position and operative by such movements to move the key controlled members into and out of operative position, the movement of the space key toward the frame of the machine moving said key controlled members out of operative position in the keyboard and the movement of the space key away from the frame of the machine moving said key controlled members and the keys carried thereby into their respective positions in the keyboard.

63. The combination with the frame of the machine which in its entirety terminates in the rear of the keyboard when the latter is in position for use, of key carrying members supported wholly from within the frame of the machine and movable relatively one to another from their respective positions in the keyboard into the frame of the machine a distance sufficient to contract the keyboard and bring the keys close to the frame of the machine, and a movable transverse bar supported wholly from within the frame of the machine and cooperative with the key carrying members to move them.

64. In a typewriting or like machine, the combination of a keyboard, printing instrumentalities controlled by the keys thereof, the frame of the machine which in its entirety terminates in the rear of the keyboard when the latter is in condition for use, and means which enable the keys of the keyboard to move relatively one to another from their operative positions in the keyboard to a contracted relationship adjacent to the frame of the machine.

65. The combination with the frame of the machine which in its entirety terminates in the rear of the keyboard when the latter is in condition for use, of members carrying keys arranged in different banks of the keyboard and supported wholly from within the frame of the machine, the banks of keys being movable relatively one to another from their respective positions in the keyboard to contract the keyboard and bring the keys close to the frame of the machine and reduce the dimensions of the machine.

66. The combination with the frame of the machine which in its entirety terminates in the rear of the keyboard when the latter is in condition for use, of key carrying members supported wholly from within the frame of the machine and movable rela-

tively one to another from their respective positions in the keyboard of the machine into the frame a distance sufficient to contract the keyboard and bring the keys close to the frame and thus eliminate the keyboard and reduce the dimensions of the machine, a movable transverse bar supported wholly from within the frame of the machine and cooperative with said key carrying members to move them into the frame of the machine, and a second transverse bar cooperative with said key carrying members to move them and the keys carried thereby into their respective positions in the keyboard.

67. The combination with the frame of the machine which in its entirety terminates in the rear of the keyboard when the latter is in condition for use, of printing instrumentalities, key carrying members for actuating said printing instrumentalities, said members being supported wholly from within the frame of the machine and movable relatively one to another to contract the keyboard and bring the keys close to the frame of the machine and thus reduce the dimensions of the machine, and a space key movable into and out of operative position and operative to move said key controlled members.

68. The combination with the frame of the machine which in its entirety terminates in the rear of the keyboard when the latter is in condition for use, of key carrying members supported wholly from within the frame of the machine, and movable fore and aft of the machine relatively one to another from their respective positions in the keyboard to contract the latter and bring the keys close to the frame and thus reduce the dimensions of the machine, and means by which the said movement of one of said keys is effective to move other of said keys.

69. In a typewriting machine, the combination of printing instrumentalities and a keyboard having printing keys mounted each to be separately movable to afford a contraction of the keyboard.

70. In a typewriting machine, the combination of a machine frame, a keyboard, the keys of which at all times are outside of the frame of the machine, and means whereby the keys of the keyboard may receive a fore and aft rectilinear movement relatively one to another to bring them close to but outside of the frame of the machine and thus reduce the dimensions of the machine.

71. In a typewriting machine, the combination of the frame of the machine, printing instrumentalities, and actuating means for said printing instrumentalities, said actuating means comprising a series of two-part actuating devices, one part or member of each of said devices being pivoted within the frame of the machine and the other part being a key carrying member carried wholly

by and movable on its companion pivoted member to afford a movement of said key carrying members toward the frame of the machine to a compact position and thus reduce the dimensions of the machine.

72. In a typewriting machine, the combination with a keyboard comprising printing keys and a space key, said space key being part of a pivoted frame whose pivotal movement controls the escapement, of means for affording a relative fore and aft movement between said pivoted frame and the printing keys in order to bring the space key and printing keys into closer relation and reduce the fore and aft dimensions of the keyboard.

73. In a typewriting machine, the combination with a keyboard comprising printing keys and a pivotally mounted space key, of means for collapsing the machine and thereby reducing the dimensions thereof, said means comprising means for effecting a fore and aft relative movement between the space key and the printing keys when the machine is collapsed, thereby reducing the fore and aft dimensions of the keyboard.

74. In a typewriting machine, the combination of printing keys, a frame including pivotally supported side arms, a space key forming part of said frame, and means for affording a relative movement between said frame and printing keys in order to effect a relative movement between the space key and printing keys toward and away from each other and thereby contract or expand the keyboard.

75. In a typewriting machine, the combination of printing keys, a space key, means for mounting said keys for direct relative fore and aft movement in order to bring the space key into compact relation with the printing keys, and means for mounting the space key for pivotal operating movement to control the escapement.

Signed at the borough of Manhattan, city of New York, in the county of New York and State of New York, this 11th day of August, A. D. 1915.

JOHN H. BARR.

Witnesses:

CHARLES E. SMITH,
L. NELSON.