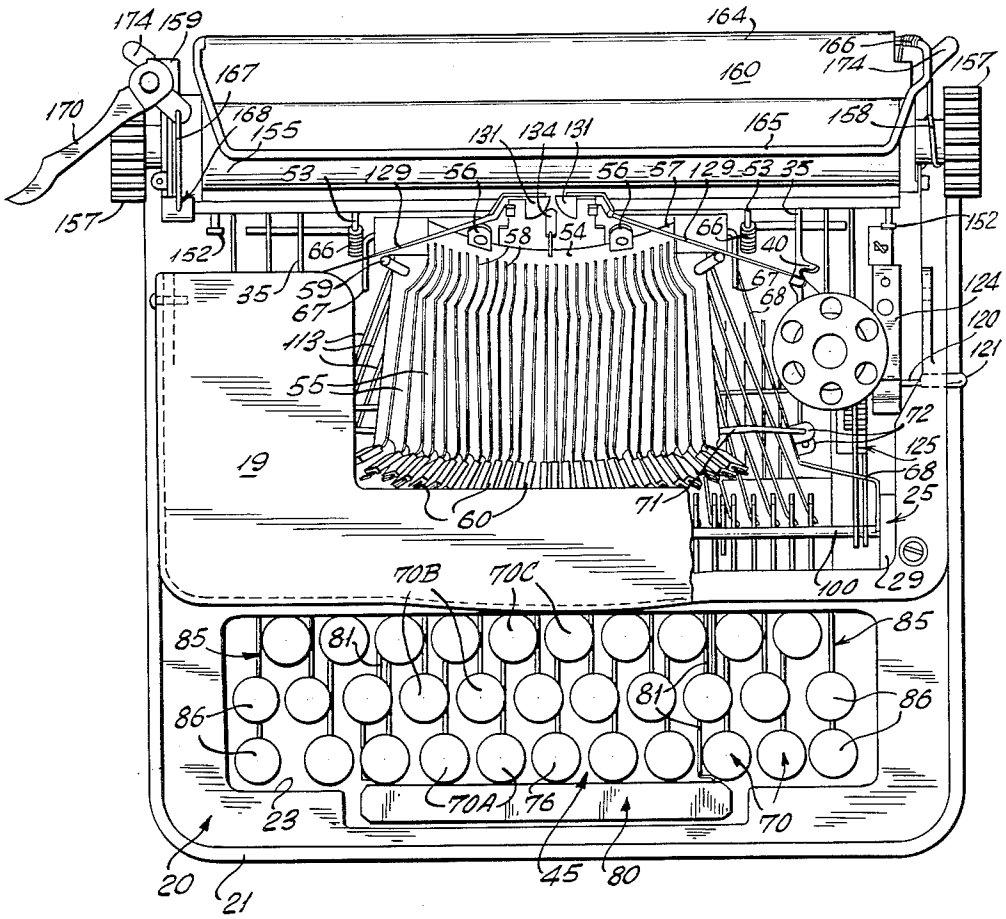
Dec. 14, 1965 W. E. REXFORD 3,223,220

TYPEWRITER HAVING SLIDING UNIVERSAL MEMBER

Filed March 13, 1963 10 Sheets-Sheet 1

Fig. 1.



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TYPEWRITER HAVING SLIDING UNIVERSAL MEMBER

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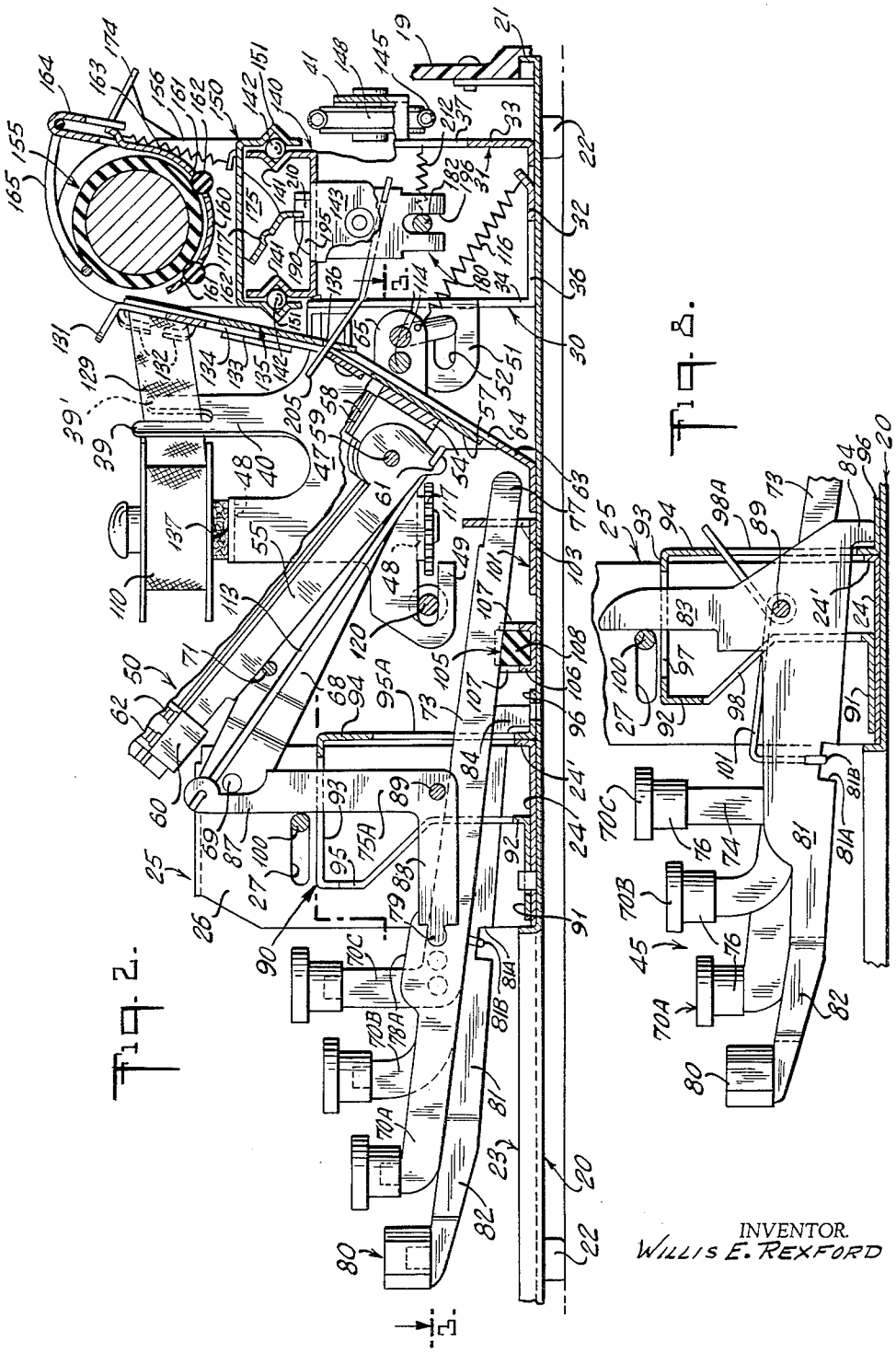

FIG. 2.

FIG. 3.

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TYPEWRITER HAVING SLIDING UNIVERSAL MEMBER

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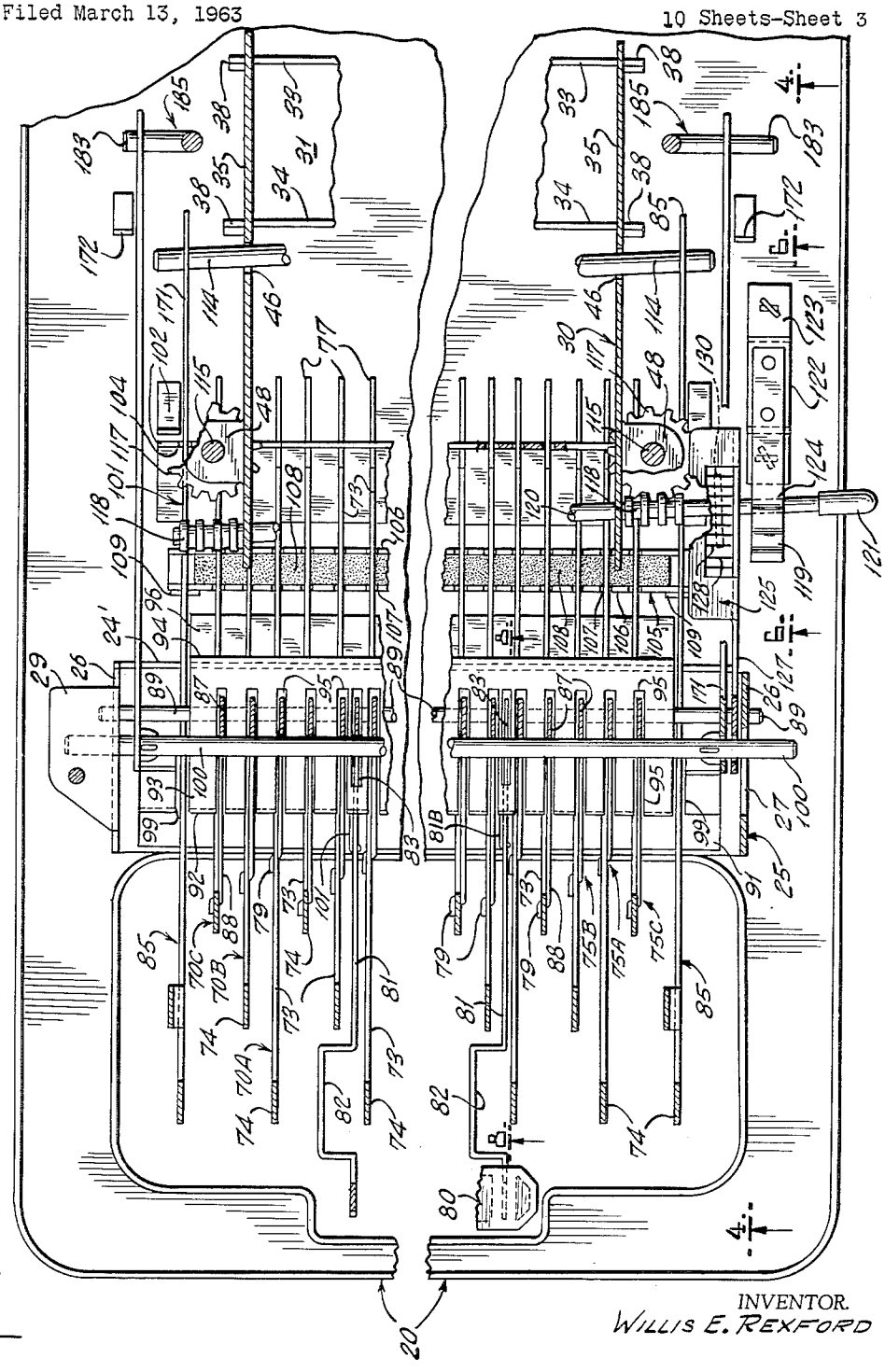

FIG. 3.

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TYPEWRITER HAVING SLIDING UNIVERSAL MEMBER

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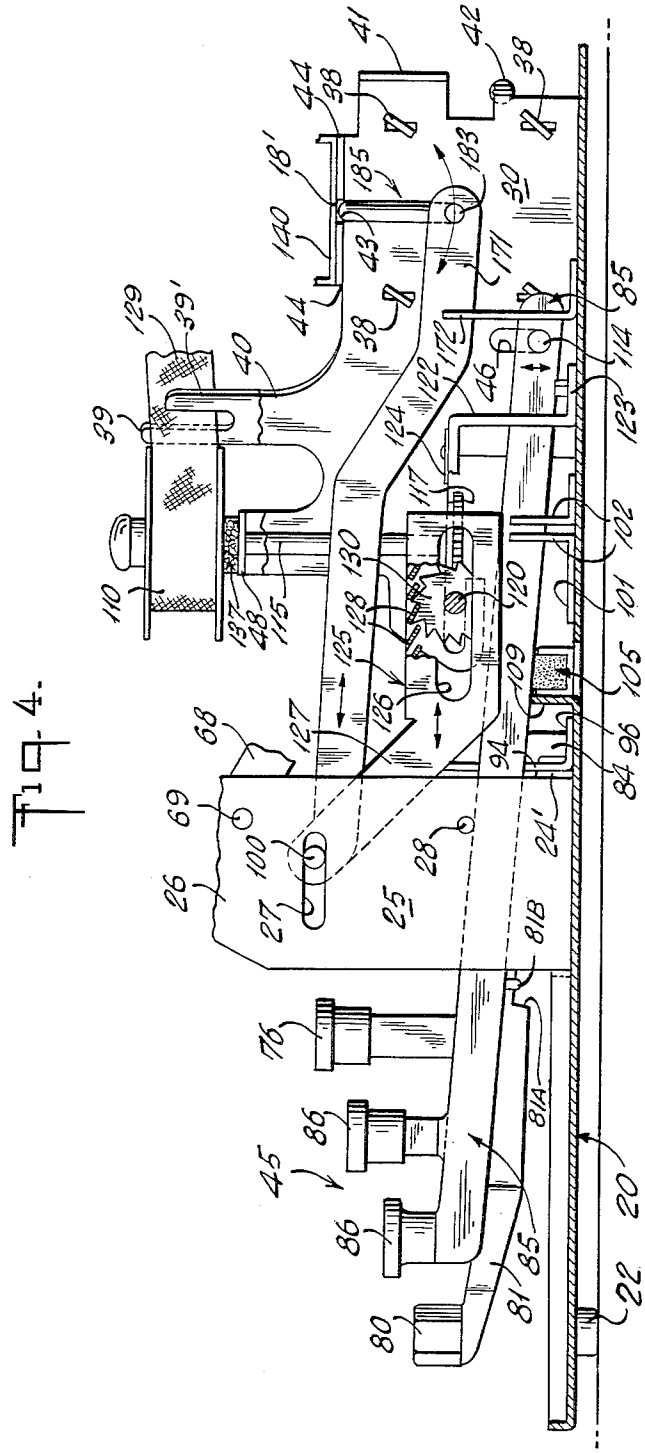

Fig. 4.

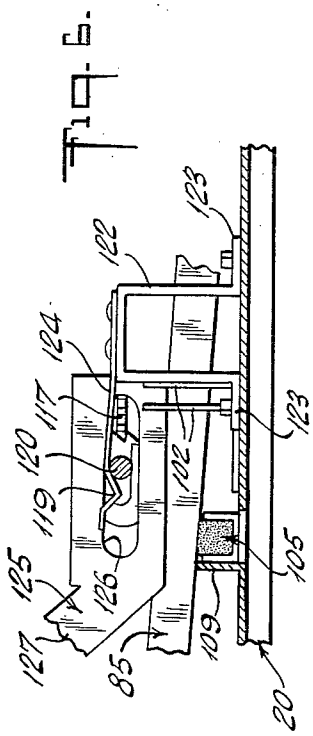

Fig. 5.

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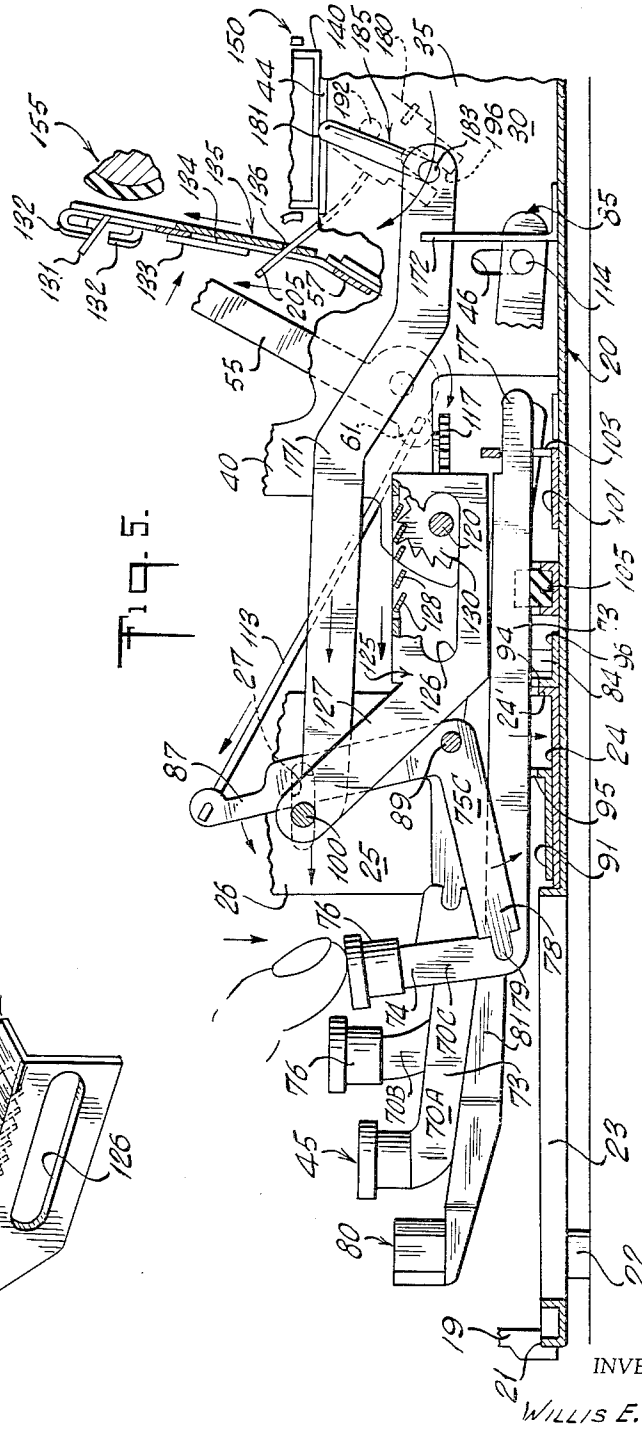

Fig. 5.

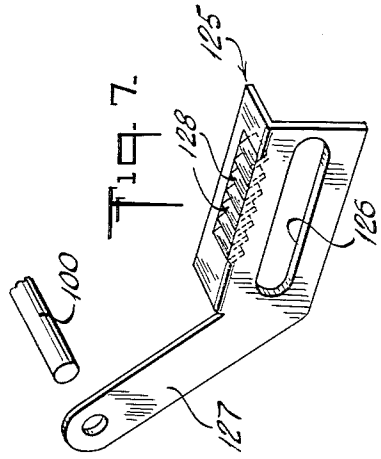

Fig. 7.

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TYPEWRITER HAVING SLIDING UNIVERSAL MEMBER

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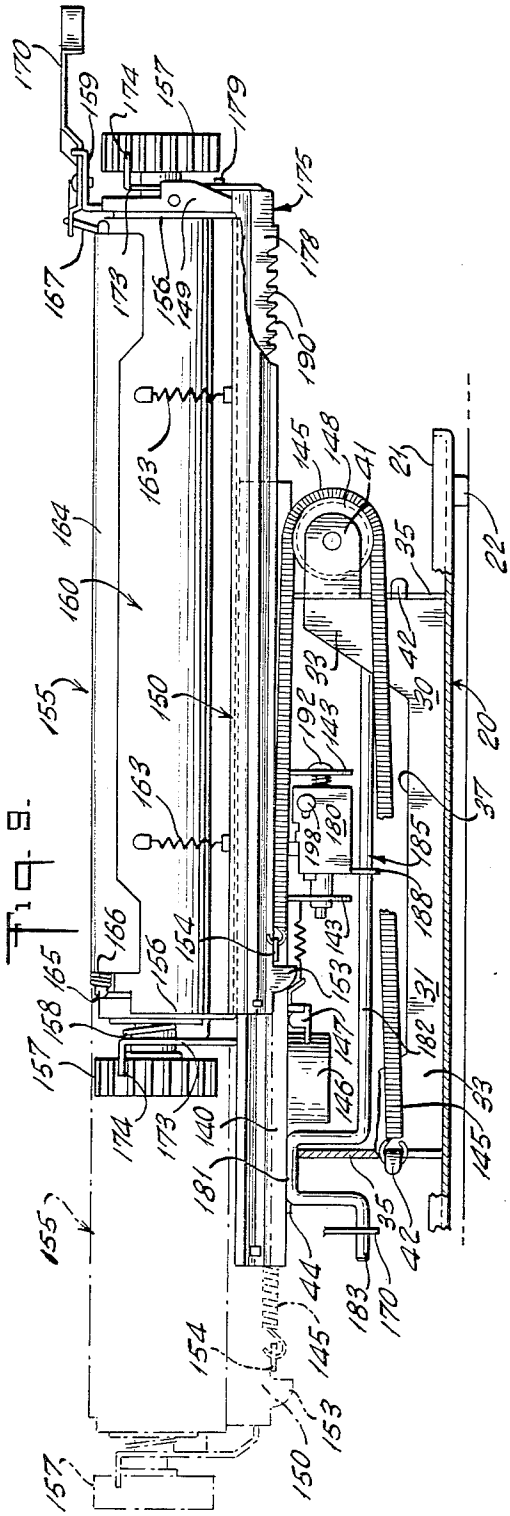

Fig. 9.

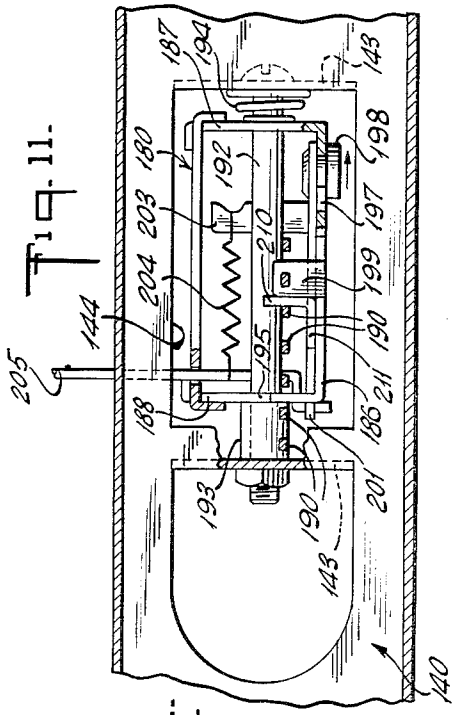

Fig. 11.

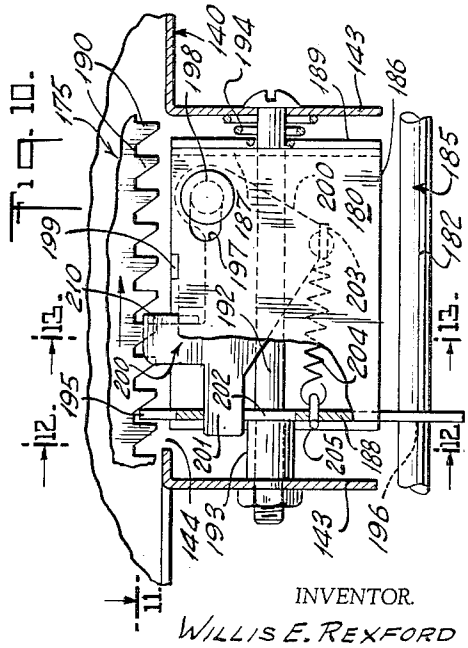

Fig. 10.

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TYPEWRITER HAVING SLIDING UNIVERSAL MEMBER

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Fig. 12.

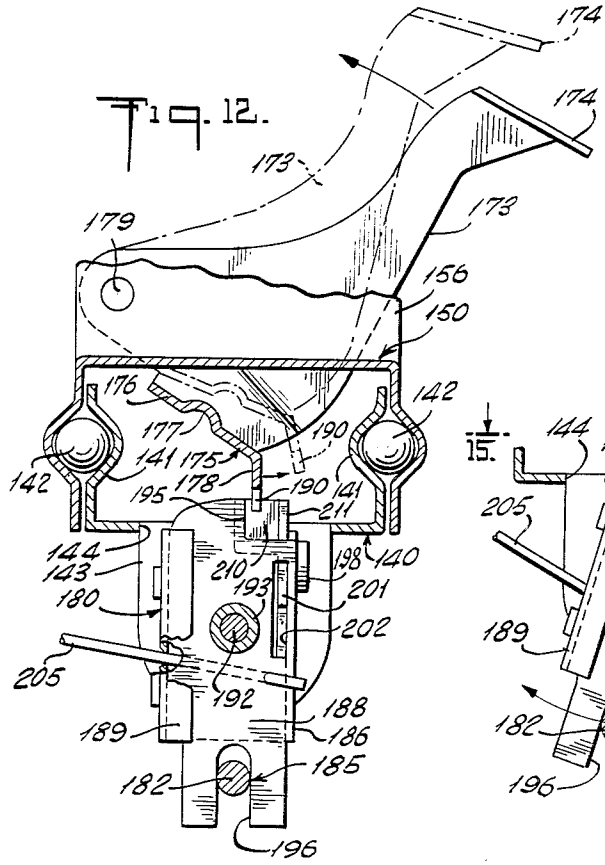


Fig. 13.

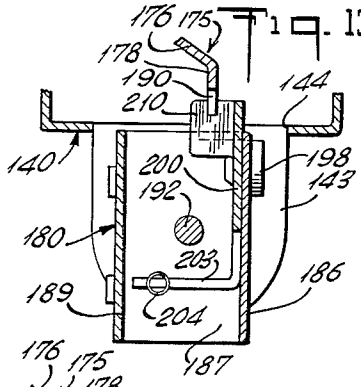


Fig. 14.

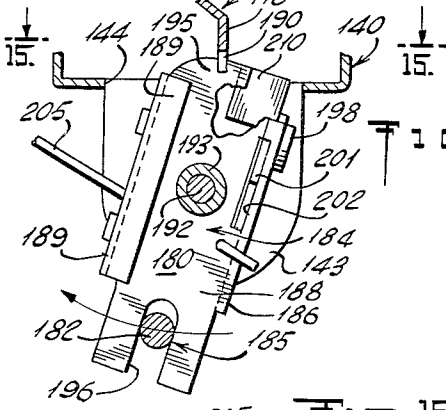


Fig. 15.

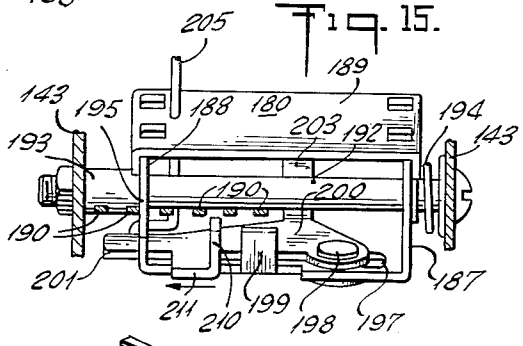
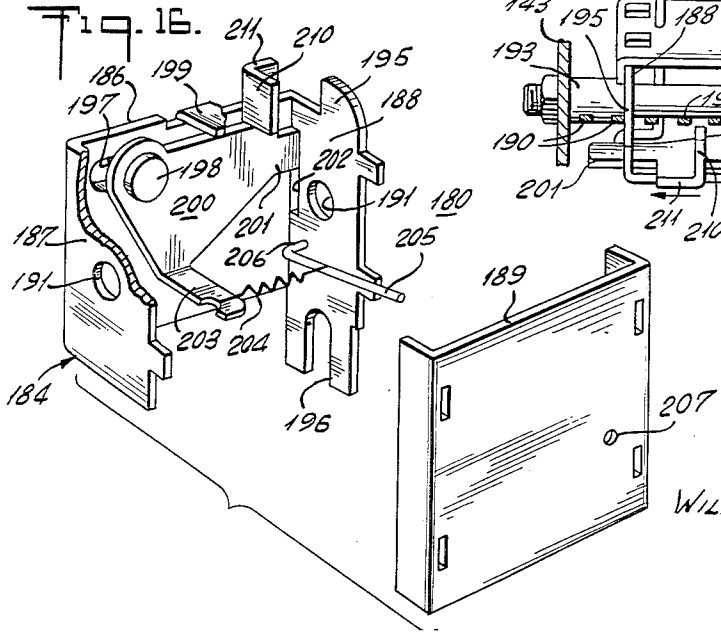


Fig. 16.



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TYPEWRITER HAVING SLIDING UNIVERSAL MEMBER

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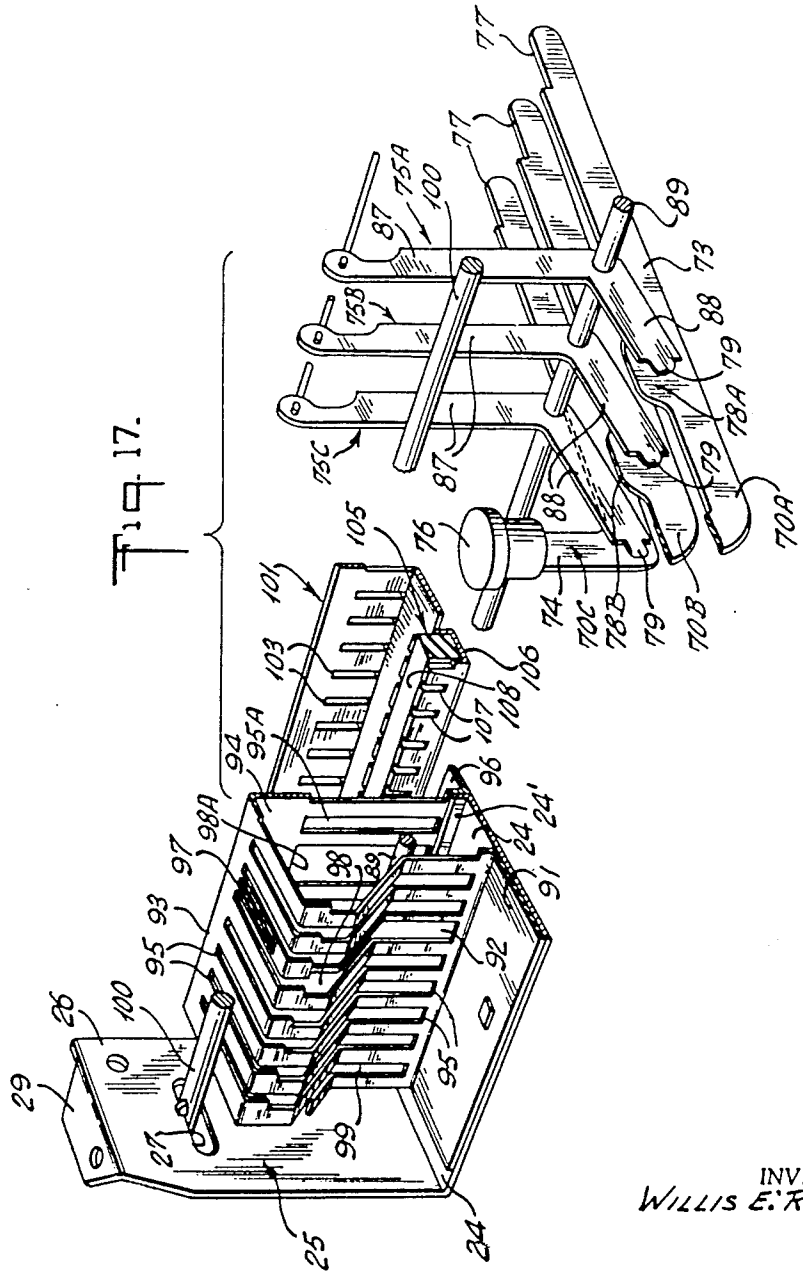
Fig. 17.



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TYPEWRITER HAVING SLIDING UNIVERSAL MEMBER

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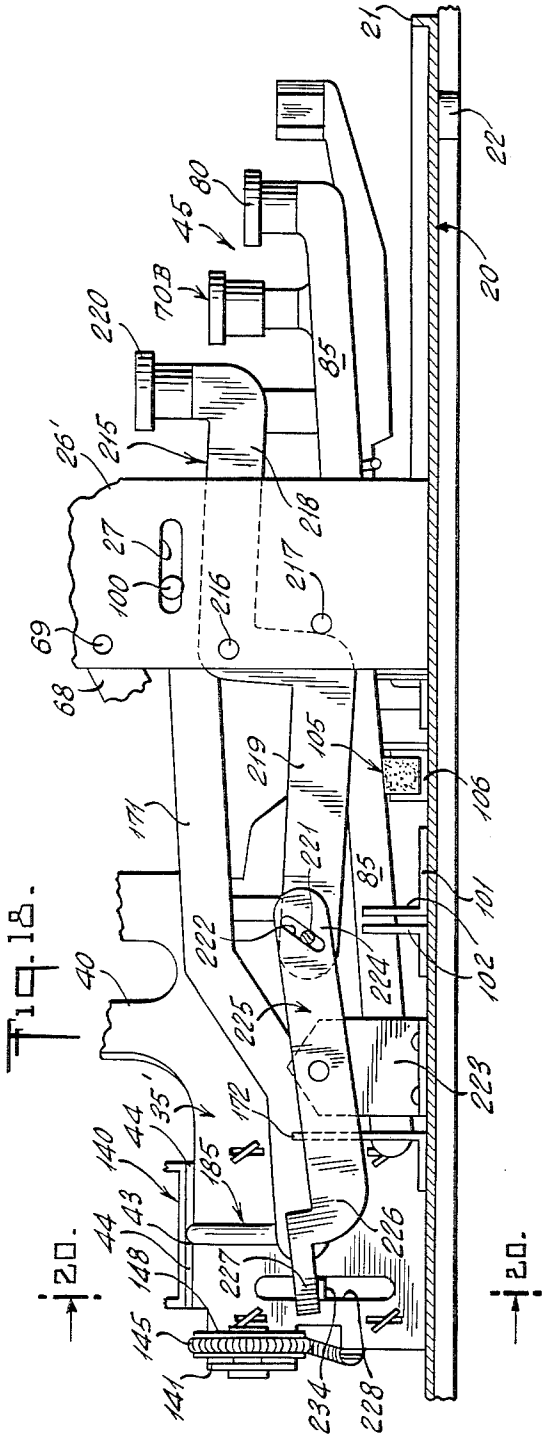

Fig. 18.

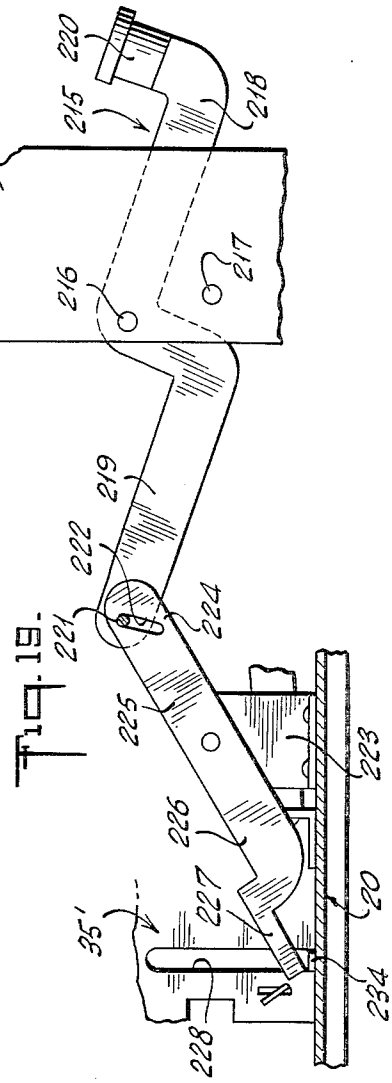

Fig. 19.

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TYPEWRITER HAVING SLIDING UNIVERSAL MEMBER

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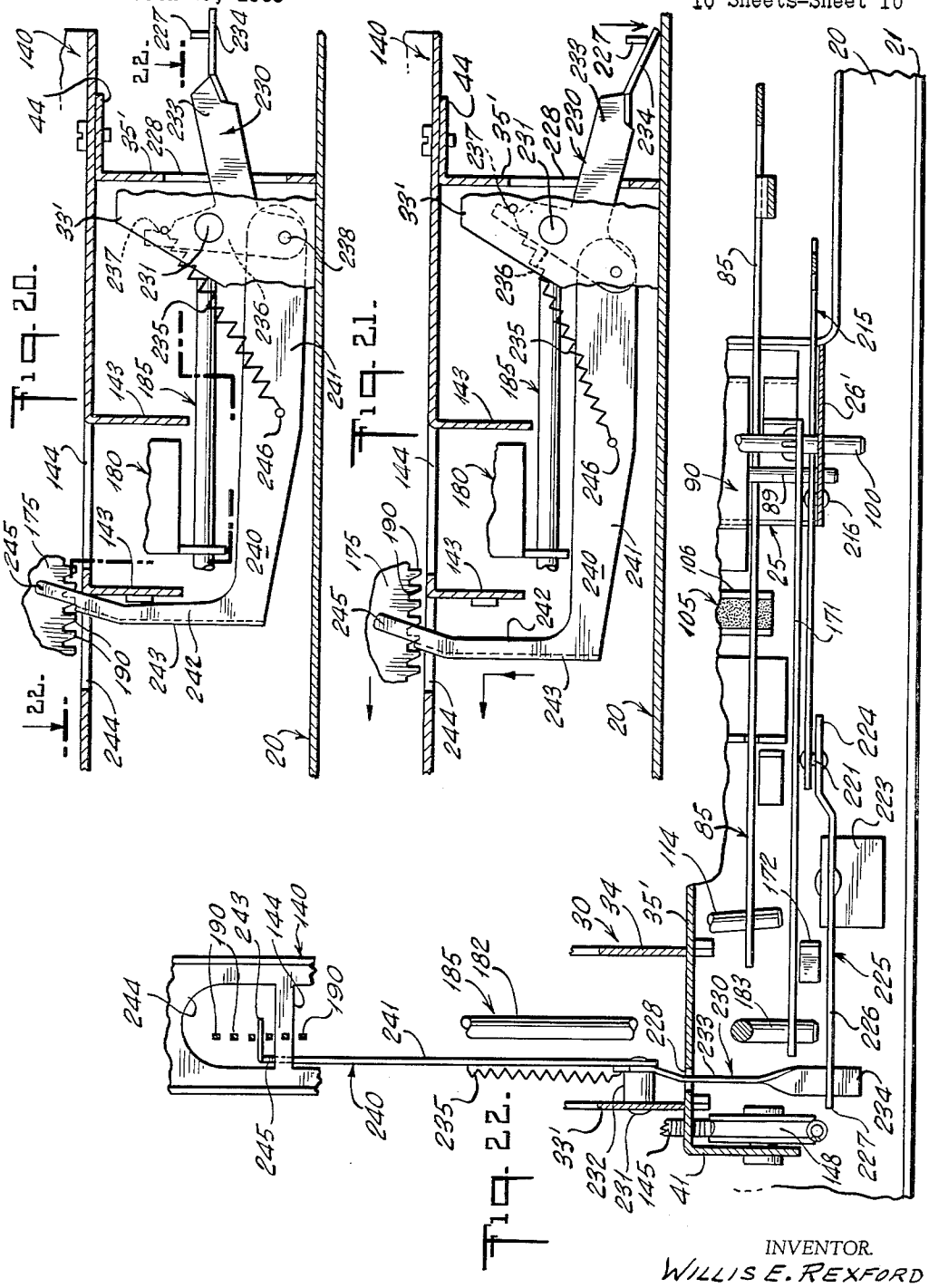

Fig. 20.

Fig. 21.

Fig. 22.

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United States Patent Office 3,223,220 Patented Dec. 14, 1965

3,223,220

TYPEWRITER HAVING SLIDING UNIVERSAL MEMBER

Willis E. Rexford, Girard, Pa., assignor to Louis Marx & Co., Inc., New York, N.Y., a corporation of New York

Filed Mar. 13, 1963, Ser. No. 264,843
6 Claims. (Cl. 197—22)

This invention relates to typewriters and, more particularly, to an improved portable typewriter characterized by simplicity and inexpensiveness of parts, ease of construction and assembly, and reliability in operation.

The primary object of the present invention is to provide a typewriter which, in addition to ease and simplicity of manufacture and assembly and ease and simplicity of operation, is characterized by improvements in various components such as the universal bar mechanism, the carriage escapement mechanism, the ribbon feed mechanism, the guiding means for the typing keys, the carriage biasing means, and the back spacing means.

Thus, a particular feature of the invention is a novel key guide or "comb" which is formed of a metal stamping having a plurality of slots extending transversely thereof and in longitudinally spaced relation. These slots act as guides not only for the typing keys but also for the pivoted levers supporting a space bar and for bell cranks interconnecting the typing keys to the type bars of the type basket.

The space bar levers, as well as the bell cranks, have portions projecting through slots in the upper surface of this comb, and a universal bar or rod is mounted to extend over this upper surface in somewhat spaced relation thereto and is arranged for bodily shifting sidewise. As a typing key is operated, or as the space bar is depressed, the universal bar is shifted bodily and this shifting of the universal bar controls operation of various parts of the typewriter such as the ribbon feed and the carriage escapement mechanism. Furthermore, the bell cranks, the typing keys and the space bar levers are easily inserted into the guide comb, thus contributing to the simplicity and efficiency of assembly of the parts.

The novel construction and design of the carriage escapement mechanism provides a positive two-step advance of the carriage. The escapement mechanism includes an oscillatably mounted pawl mechanism cooperating with a rack secured to the carriage, and this rack has associated therewith a pair of operating levers or handles by means of which it may be lifted out of operative relation with the pawl mechanism so that the carriage may be readily and easily positioned at any place along its path of travel. The pawl mechanism is also utilized as a novel means for raising the ribbon into proper position for engagement by a type bar, while maintaining the ribbon otherwise lowered so as to expose the typed material to view. For this purpose, a spring finger, such as a spring wire, projects from the pawl mechanism and is freely engaged through an aperture in a ribbon guide mounted for substantially vertical sliding movement.

The novel means for biasing the carriage assembly in one direction comprises a relatively elongated coil spring having one end secured to the carriage and its opposite end secured to a fixed part of the typewriter, with the spring extending around a pulley mounted adjacent one side of the typewriter. This biasing means provides a smooth movement of the carriage to the left during typing.

The novel ribbon feeding means includes a sheet metal stamping which is in the form of an elongated angle connected to the universal bar and being formed with rack teeth engageable with a pawl. The sheet metal rack member rests freely by gravity over the pawl and is moved

in one direction, by operation of the universal bar, to operate the pawl and then slides freely back over the pawl teeth during reverse motion of the universal bar. Rotation of the pawl, through gearing and worms, rotates, selectively, one or the other of the shafts to which the ribbon spools are keyed.

A novel back spacing means is provided which includes two sets of linkages, one extending along one side of the typewriter and the other extending along the rear of the typewriter, these two sets of linkages being operatively interconnected in a novel manner. The linkage extending along the back of the typewriter is connected with the carriage escapement mechanism in a novel manner to effect back spacing responsive to operation of a "back space" key.

For an understanding of the principles of the invention, reference is made to the following description of a typical embodiment thereof as illustrated in the accompanying drawings. In the drawings:

FIG. 1 is a plan view, partly broken away, of a typewriter embodying the invention;

FIG. 2 is a longitudinal vertical sectional view through the typewriter shown in FIG. 1;

FIG. 3 is a horizontal sectional view taken on the line 3—3 of FIG. 2;

FIG. 4 is a vertical sectional view taken on the line 4—4 of FIG. 3;

FIG. 5 is a view corresponding to a portion of FIG. 2, but illustrating the parts in a different position;

FIG. 6 is a partial vertical sectional view taken on the line 6—6 of FIG. 3 and illustrating the ribbon feed shifting means;

FIG. 7 is an exploded partial perspective view of a ratchet means associated with the ribbon feed;

FIG. 8 is a partial vertical sectional view, taken on the line 8—8 of FIG. 3 and illustrating the operation of the universal bar by the space key;

FIG. 9 is a rear elevation view, partly in section, illustrating the carriage advancing mechanism;

FIG. 10 is a partial elevational view, partially in section, illustrating the escapement mechanism for the carriage;

FIG. 11 is a horizontal sectional view taken on the line 11—11 of FIG. 10;

FIGS. 12 and 13 are sectional views taken on the lines 12—12 and 13—13, respectively, of FIG. 10;

FIG. 14 is a view of a portion of FIG. 12, but illustrating the escapement mechanism in a different position;

FIG. 15 is a sectional view taken on the line 15—15 of FIG. 14;

FIG. 16 is an exploded perspective view of the escapement mechanism for the carriage;

FIG. 17 is an exploded perspective view of the guide comb and the association of the keys with the universal bar;

FIG. 18 is a partial side elevational view, partly in section, of a modified form of the typewriter shown in FIGS. 1 through 17 and including a back spacing arrangement;

FIG. 19 is a partial side elevational view, partly in section and with parts omitted, illustrating part of the linkage of the back spacing mechanism in an operated position;

FIG. 20 is a partial vertical sectional view taken on the line 20—20 of FIG. 18 and illustrating further components of the back spacing linkage;

FIG. 21 is a view similar to FIG. 20 but illustrating the parts in an operated position; and

FIG. 22 is a partial horizontal sectional view of the typewriter shown in FIGS. 18 thruogh 21, taken on the line 22—22 of FIG. 20.

Support base and bracket assembly

Referring to FIGS. 1 through 5, 8 and 9, the typewriter includes a support base **20** which may be a sheet metal stamping, and which is formed with an upstanding peripheral rim **21** and provided with support feet **22**. Adjacent the keyboard, base **20** is formed with a relatively large cutout **23** conforming in general plan to the plan of the keyboard including the space bar. A shell or partial cover **19** for the typewriter may be secured to the rim **21** of base **20** in any desired manner, not forming any part of the invention.

Base **20** has secured thereto sheet metal brackets for supporting the various operating elements. There are two principal brackets, including a forward bracket, generally indicated at **25**, and a rear bracket, or carriage guide bracket, generally indicated at **30**. Brackets **25** and **30** may be secured to base **20** in any desired manner as by riveting, spot welding, the use of twisted tongues, or the like.

Bracket **25** has the functions of supporting the universal bar or rod **100**, which controls the ribbon feed and carriage escapement responsive to actuation of the typing keys or the space bar, and further supporting a pivot rod or axle **89** for the bell crank levers **75**, operated by the individual keys, and for the space bar support arms or levers **81**. To this end, bracket **25** includes a relatively elongated flat base **24** extending transversely of base **20** immediately to the rear of rimmed cutout **23**. At each end of base portion **24** of bracket **25** there are upstanding arms **26** which are mirror copies of each other. Each arm **26** has a horizontally extending slot **27** near its upper end which is arranged to guidingly receive the universal bar **100**. Somewhat below its mid-height portion, each arm **26** is formed with an aperture **28** arranged to receive an end of pivot rod **89** for the bell cranks and the space bar levers. Each upright arm **26** may have a substantially horizontal outturned upper end **29** which may be apertured.

Rear bracket **30** supports the carriage assembly, the type bar basket, the ribbon spools, the ribbon guides, and other parts cooperative with these components. Bracket **30** includes a generally channel shaped sheet metal member **31** (FIG. 2) extending transversely of base **20** adjacent the rear edge thereof, channel shaped member **31** having a base **32** spot welded or otherwise secured to support base **20**, a rear wall **33**, and a pair of front walls **34**. Each front wall **34** extends inwardly a little less than one-third the length of channel member **31**, and the inner edges of front walls **34** coincide with the ends of a rectangular notch **36** in channel base **32**. Rear wall **33** is formed with a generally trapezoidal notch **37** extending downwardly from the upper edge thereof. Rear bracket **30** further includes a pair of generally vertical side members or walls **35** (FIG. 3) which are mirror copies of each other. The outer ends of walls **33** and **34** are formed with tongues projecting therefrom which extend through correspondingly located slots in each side wall **35** and are twisted over to anchor the side walls to channel member **31**.

Each side wall **35** of bracket **30** extends forward a substantial distance from channel member **31** and, rearwardly of this channel member, is formed, at its upper edge, with a laterally and vertically extending apertured ear **41**. Below each ear **41**, each side wall **35** has a bent tongue **42** projecting from its rear edge. The ear **41** on the left side wall **35**, as viewed from the front of the typewriter, is used to rotatably mount a guide pulley **148** for a carriage return spring **145**, and the bent tongue **42** on the right side wall **35** as utilized as an anchor for one end of spring **145**, which spring is trained over pulley **148**. Each side wall **35** further has a notch **43** in its upper edge, substantially centrally of channel **31**, and a pair of ears **44** extend horizontally outwardly on either side of notch **43**. The ears **44** on each of the side walls

35 serve to support the carriage assembly, and further act, in cooperation with notch **43**, to form a bearing for a crank member **185** operating the carriage escapement mechanism.

Forwardly of channel member **31**, each side wall **35** is formed, adjacent its lower edge, with a vertically extending slot **46** for a purpose to be described. A tongue **40** extends from the upper edge of each side wall **35**, and has a forked upper end forming an outwardly opening notch which serves as a ribbon guide. Tongues **40** are twisted out of the general plane of each side wall **35** at an angle of about 45 degrees, and it will be noted that the forward arm **39** of each ribbon guide extends a little above the rear arm **39'** thereof. The upper portion of each wall **35** extends forwardly beyond ribbon guide **40**, as indicated at **47**, and each extension **47** is formed with a pair of vertically spaced and aligned outwardly extending apertured horizontal ears **48** which conjointly receive a drive spindle **115** for a ribbon spool **110**. Forwardly of ears **48**, each extension **47** is formed with a downwardly projecting and rearwardly opening hook **49** for a purpose to be described.

At a level somewhat above the center of slots **46**, the inner edge of each front wall **34** of channel member **31** has a projecting ear **51** (FIG. 2) which is bent forwardly to extend in a vertical plane and each ear **51** is formed with a horizontal slot **52** for a purpose to be described. Also, the upper edge of each front wall **34** has a hook **53** (FIG. 1) bent forwardly therefrom, likewise for a purpose to be described.

Type bar assembly

The present invention features shifting between different characters by shifting the type bar basket. The type bar basket, which is generally indicated at **50**, is essentially conventional except for the aforementioned shifting operation and the connection of the type bar levers in operative relation with the typewriter keys.

Basket **50** includes a generally arcuately elongated casting **54** which has apertured ears **56** by means of which it may be secured by screws to a plate **57**. Casting **54** is formed with outwardly opening radially extending slots **58** each of which receives the pivot end of a type bar lever **55**. The pivot ends of levers **55** are apertured to receive an arcuate pivot rod or shaft **59** which lies in a surface groove in casting **54** and is secured therein in any desired manner. Adjacent its pivot portion, each type bar lever **55** is formed with an apertured ear **61** for a purpose to be described. The outer end of each type bar lever has a type bar **60** secured thereto, each type bar **60** being a casting carrying a pair of characters **62** spaced longitudinally thereof, with the casting being anchored over the free end of the associated level **55**.

Mounting plate **57** for type basket **50** slides on a support plate **63** which has bent upper and lower ends. The upper end of support plate **63** is spot welded or otherwise secured to front walls **34** of channel member **31**, and the lower bent end of support plate **63** is spot welded or otherwise secured to support base **20**. Intermediate its ends, support bracket **63** is formed with a relatively large and substantially rectangular notch **64**, and an angled ear **65** on the rear surface of plate **57** projects through notch **64** and rearwardly of support bracket **63**. Mounting plate **57** is formed with a pair of spaced preferably circular apertures which are at the same horizontal level.

Plate **57** is guided for rectilinear movement along support bracket **63** in any suitable manner. The support bracket, and the entire type basket **50**, are biased to an upper limit of movement by tension springs **66** connected between ears on the ends of plate **57** and the hooks or ears **53** on the front walls **34** of the channel member **31**. The opposite ends of plate **57** are formed with apertured and forwardly directed ears **67** to each of which is pivotally connected one end of a yoke member **68**. Each yoke member **68** is in the form of a strap which has its

forward end bent laterally outwardly and then forwardly. The forward ends of yokes 68 are pivotally secured to vertical arms 26 of bracket 25 by suitable means, such as rivets 69. The type bars 55 are gravity biased to the position illustrated in FIG. 2 where they rest against a support 71 in the form of a generally arcuate rod having downturned ends engaged through aligned apertured ears 72 on the two yokes 68.

Keyboard mechanism

The keyboard, generally indicated at 45, includes the typing keys 70, a space bar 80, and shift keys 85. As will be noted from FIGS. 1, 2, 4, 5 and 8, the keys 70 are arranged in three rows comprising a lower row, an intermediate row, and an upper row. Also, and with particular reference to FIG. 17, it will be noted that the keys are arranged in groups of three, with each key of a group differening in lever length from the adjacent keys. Thus, the longest keys 70A are used for the lower row, the intermediate length keys 70B are used for the intermediate row, and the shortest keys 70C are used for the upper row.

Each key is stamped from metal and is in the form of an angular strip of metal including a generally horizontal arm 73 and a generally vertical arm 74. There is one key 70 associated with each of the type bar levers 55, and the generally vertical arm 74 of each key has an operating head or button 76 secured on its upper end and having printed, or otherwise provided on its face, the characters of the associated type bar 60.

Each horizontal arm 73 has a reduced inner end 77 for a purpose to be described. Furthermore, each key 70 is formed with an aperture, with the apertures being located differently in each of the keys 70A, 70B and 70C. In keys 70A, this aperture is located adjacent an enlargement 78A spaced substantially from vertical arm 74, and in keys 70B, the aperture is located adjacent an enlargement 78B (FIG. 17) which is much closer to vertical arm 74. In keys 70C, the aperture is located at the intersection of arms 73 and 74.

Space bar 80 is a relatively elongated plastic element which is supported upon a pair of levers 81. Each lever 81 is a relatively elongated and substantially flat metal stamping having an upturned outer end receivable in a recess in space bar 80. In alignment with the lower row of keys 70A and their operating buttons 76, levers 81, which are mirror copies of each other, are off-set, as at 82, to provide clearance for the operating buttons 76 of adjacent key levers 70, particularly when these operating buttons are depressed. For a purpose to be described, adjacent the rearward end of each lever 81 there is an upstanding arm 83 which normally extends in a substantially vertical direction. The rear end of each lever 81 is formed with a downturned abutment 84 for a purpose to be described. Each lever 81 is provided with a cutout 81A (FIG. 8) receiving one end of a spring 81B which encircles a pivot rod 89 to urge the lever in a clockwise direction to its normal position, with abutment 84 acting as a stop.

There are a pair of shift levers 85, one at each end of keyboard 45. Each shift lever 85 is a relatively elongated stamped metal strip provided with a pair of operating buttons 86 adjacent its forward end, one operating button being aligned with the lower row of keys 70A and the other operating button being aligned with the intermediate row of keys 70B. Keys 86 are plastic elements suitably labeled, stamped, or imprinted with the designation "FIG. SHIFT," and these plastic buttons have recesses engaging upstanding arms on each lever 85. The inner end of each lever 85 is apertured at the location of vertical slots 46 in side walls 35 of rear bracket 30. The purpose of this will be described hereinafter.

Each typing key is operatively connected to its associated type bar through the medium of a bell crank 75. These bell cranks, while otherwise identical in construction, have the lengths of their horizontal arms varied so that there are three groups of bell cranks. Bell cranks 75A are associated with the lower row of keys 70A, bell cranks 75B are associated with the intermediate row of keys 70B, and bell cranks 75C are associated with the upper row of typing keys 70C. Each bell crank includes a generally vertical arm 87 and a generally horizontal arm 88, and has a pivot aperture at the intersection of these arms. Vertical arms 87 of the bell cranks are substantially equal in length. However, bell cranks 75A have the shortest horizontal arms 88, bell cranks 75B have horizontal arms 88 of an intermediate length, and bell cranks 75C have horizontal arms 88, which are longer than the corresponding arms of bell cranks 75A and 75B. The forward end of each horizontal arm 88 is formed with an angularly off-set tongue 79 engageable loosely through the aperture of the associated key 70 so as to pivotally connect this arm to the associated key. It will be noted that, with each key 70 pivotally connected to the forward end of arm 88 of its associated bell crank lever 75, the lengths of horizontal arms 73 of the keys 70, rearwardly of the bell cranks 75, are equal to each other.

Guiding structure for keyboard elements

The principal component of the guiding structure for the keyboard elements is what may be termed a "key comb" 90 shown in FIGS. 2, 3, 5, 8 and 17. This key comb is a formed and die cut stamping of sheet metal, which is bent or otherwise formed to provide a substantially horizontal and relatively wide front flange 91, a front wall 92, a top wall 93, a rear wall 94, and a relatively narrow rear flange 96. Front flange 91 is suitably anchored, in any desired manner, to base 24 of front bracket 25, for example by tongues projecting from base 24 through apertures in flange 91 and twisted to lock flange 91 to base 24. Rear flange 96 is similarly anchored to main support base 20 of the typewriter. This rear flange also forms an abutting surface for engagement with rear abutments 84 of space bar levers 81.

Comb 90 is suitably located by engagement of its rear wall 94 with a short upturned flange 24' along the rear edge of base 24 of front bracket 25.

Comb or guide 90 is formed with a series of slots 95 extending through front wall 92 and top wall 93, these slots 95, in the front wall portion, being wide enough to receive each typing key 70 and its associated bell crank 75 and, in the top wall, being somewhat narrower so as to have sufficient clearance to receive only the upright arms 87 of bell cranks 75. Rear wall 94 is formed with slots 95A, each of which is aligned, fore and aft, with a slot 95, and slots 95A are of a width sufficient to receive, with clearance, horizontal arms 73 of levers 70. Front wall 92 extends vertically, then slopes forwardly and outwardly, and then has a short vertical section joined to top wall 93. Rear wall 94 lies in a single plane.

At locations laterally of the typewriter corresponding to the lateral locations of vertical arms 83 of space bar levers 81, comb top wall 93 is formed with short slots 97. Just a short distance laterally of each of the slots 97, front wall 92 of comb 90 is formed with a pair of slots 98 which are somewhat wider than slots 95 and 95A. Also, rear wall 94 is formed with slots 98A which are aligned, fore and aft, with slots 98 and which have substantially the same width as slots 98. Slots 98 and 98A are sufficiently wide to permit the passage, with clearance, of a key lever arm 73, a bell crank arm 88, and a space bar lever 81. Each end of front wall 92 extends somewhat beyond the corresponding ends of top wall 93 and rear wall 94, and these extended portions are reduced in height and formed with upwardly opening slots 99 for receiving shift levers 85.

In assembling the keyboard levers to the comb, bell cranks 75 are inserted from the front into the comb and space bar levers 81 are likewise inserted from the front

through the comb. Pivot rod 89 is then inserted through holes 28 in arms 26 of front bracket 25 and through the pivot apertures in bell cranks 75 and in shift levers 85, rod 89 being held in position as by swaging or bending its ends outside arms 26 of bracket 25. When this has been effected, vertical arms 87 of bell cranks 75 will extend substantially above top wall 93 of key comb 90, as will also vertical arms 83 of the two space bar levers 81.

The guiding means for the keyboard levers further includes a guiding element 101 engageable with reduced rear ends 77 of type key levers 70 and also having a guiding relation with shift levers 85. Referring to FIGS. 2, 3, 5 and 17, rear lever guide 101 is an angular cross section member formed of sheet metal and having its base suitably anchored to main support base 20. Guide 101 may be suitably positioned fore and aft to the base by engagement of its vertical wall with tabs 102 struck up from base 20. The vertical leg of guide 101 is formed with a series of vertically extending and relatively short closed slots 103, each aligned with a type bar lever portion 73 and each having reduced end 77 of the type bar lever extending thereinto. Adjacent each end, the vertically extending rear leg of guide 101, is formed with an upwardly opening slot 104 each of which serves as a rear guide for a shift lever 85.

The typing keys 70 are biased to the upper position, or clockwise as viewed in FIG. 2, by any suitable means. Shown by way of example is a rubber spring device 105 which forms the subject matter of copending application Serial No. 264,937, filed March 13, 1963, by Shigeaki Kuramochi, now Patent No. 3,197,011, issued July 27, 1965. However, other types of spring biasing means may be used for the typing keys 70. Briefly described, rubber spring device 105 comprises a channel 106 having its base suitably anchored to main support base 20 and located between comb 90 and rear guide member 101. Channel 106 is formed with a series of upwardly opening slots 107, each receiving one of the typing keys 70 in guiding relation. A substantially rectangular and relatively elongated strip of rubber, such as foam rubber, is disposed in channel 106 and extends somewhat above the upper edge thereof so that the several typing keys 75 will bear thereagainst while having guiding relation in slots 107. The shift levers pivot about the upper edges of tabs 109 struck up from base 20 and lying against the forward outer surface of channel 105 adjacent each end thereof. Tabs 109 extend somewhat above the upper edge of channel 106. Space bar 80 is biased in an upward direction by means of coil springs 101 having a turn embracing pivot rod 89 and having one leg engaged through a slot 98A and a second leg hooked into a notch 102 in the undersurface of each space bar lever 81. This is clearly illustrated in FIG. 8.

Interconnection of the keyboard levers to the operating parts of the typewriter

Referring to FIGS. 2 and 5, for the purpose of operating a type bar 60 each time a key 70 is operated, each bell crank 75 is connected by a wire 113 to aperture 61 of the associated type bar lever 55. For this purpose, wire 113 may have a hooked end engaged in aperture 61 and an angularly off-set end engaged through the aperture at the upper end of the vertical arm of the associated bell crank.

As previously stated, the type basket is biased upwardly by springs 66 engaged between tabs 53 on rear bracket 34 and ears on type bar basket mounting plate 57. Shifting between lower case and upper case characters is effected by lowering the type bar basket rather than by raising the carriage assembly. As previously mentioned, each shift lever 85 has an aperture at its rear end substantially aligned with vertically extending slots 46 in the end plates of the rear bracket. Each shift lever 85 has associated therewith a rod 114, and each rod 114 extends through the aperture in the associated shift lever 85, through the adjacent vertically elongated slot 46, and through the horizontally elongated slot 52 in the nearer ear 51 of rear bracket 30. The inner ends of rods 114 are engaged in the respective apertures in ear 65 on plate 57. When either shift lever is operated, it is swung in a counterclockwise direction, as viewed in FIGS. 4 and 5, to move the outer end of its associated rod 114 upwardly in the adjacent vertically extending slot 46. The inner portion of each rod 114 thereupon moves forwardly in horizontal slot 52 in ear 51, and at the same time downwardly, to move ear 65, and thus mounting plate 57, downwardly. A tension spring 116 is connected at one end to ear 65 and at the other end to an upstruck ear of rear bracket 30.

The operation of feeding the ribbon and advancing the carriage, responsive to operation of a typing key or the space bar, is effected by a universal rod or bar 100. Rod 100 extends lengthwise of forward bracket 25, with its ends projecting through horizontal slots 27, suitable means being provided to prevent displacement of rod 100 from these slots. Slots 27 support rod 100 so that it is positioned slightly above upper wall 93 of comb 90 and, in a manner to be described, rod 100 is biased into engagement with vertical arms 87 of bell cranks 75 and with vertical arm 83 of each of the space bar levers 81. Each time a key 70 is depressed, its associated bell crank 75 is rocked counterclockwise, with the key 70, and particularly the horizontal arm 73 thereof, sliding rearwardly as tab 79 on the bell crank lever moves downwardly and rearwardly. Also, each time space bar 80 is depressed, the upwardly extending arms 83 of its support levers move in a counterclockwise direction. Each of these movements of a bell crank or of the arms 83 advances universal rod or bar 100 parallel to itself in a direction forwardly of the typewriter. This bodily sidewise reciprocation of universal bar or rod 100 is used to effect such actions as step-by-step advancing of the ribbon and operation of the escapement mechanism for the carriage, as will be described more fully hereinafter.

Ribbon feeding and guiding mechanism

Referring to FIGS. 1, 2, 3, 4 and 5, ribbon spools or reels 110, 110 are disengageably keyed to shafts 115 which are rotatably supported in ears 48 of the side walls of rear bracket 30, each shaft being swaged or the like above the upper ear 48 to maintain the shaft against downward displacement. A gear 117 is secured on the lower end of each shaft and meshes with a respective worm 118 on a ribbon feed control shaft or driving 120. Shaft 120 is mounted for horizontal reciprocation in the horizontal slots formed by hooked ends 49 of the side parts of rear bracket 30. Each worm 118 is formed by coiling a short piece of wire about shaft 120, with the convolutions of the coils spaced to receive the teeth the gears 117, and this wire is soldered or brazed at at least one end to shaft 120 so as to retain the "worm" against displacement axially of shaft 120. Shaft 120 is formed with an operating handle 121 at one end thereof.

Shaft 120 is selectively shiftable to engage either worm 118 with the associated gear 117, and is arranged to be retained in the adjusted position. For this purpose, an inverted U-shaped bracket 122 has outwardly projecting ears 123 which are anchored to main support base 20 as by having tabs, struck from such base, extended through slots in ears 123 and twisted to lock these ears to base 20. Bracket 122 is arranged somewhat laterally outwardly of the adjacent end of shaft 115. A leaf spring 124 is anchored to the upper surface of bracket 122 and has a V-shaped deformation 119 adjacent its free end. Spring 124 bears against shaft 120 so that the shaft may be locked either inwardly or outwardly of deformation 119.

Shaft 120, in its ribbon feed switching action, operates as follows. Assuming that shaft 120 is moved to the position shown in FIGS. 3 and 6 wherein it is inwardly

of deformation 119 of spring 124, right-hand worm 118, as viewed looking from the front of the typewriter, will be engaged with the associated gear 117 so that the shaft 115 at the right side of the typewriter, again looking from the front, will be rotated upon rotation of shaft 120. Left worm gear 118 will be disengaged from its associated gear 117 so that the left ribbon spool shaft 115 is free to rotate. To shift the ribbon feed, knob 121 is moved forwardly from the position shown in FIGS. 3 and 6. During this forward movement, shaft 120 tends to pivot about the axis of the right-hand ribbon spool shaft 115, due to engagement of right-hand worm 118 with right-hand gear 117. This swings left-hand worm 118 into engagement with left-hand gear 117 as shaft 120 engages V-shaped deformation 119. As shaft 120 snaps past this deformation and is re-engaged with spring 124 outwardly of the deformation, left-hand worm 118 remains in engagement with left-hand gear 117 to act as a pivot for shaft 120, and right-hand worm 118 is disengaged from right-hand gear 117. Right-hand shaft 115 is thereupon free to rotate, whereas left-hand shaft 115 will be rotated only when shaft 120 is rotated in a manner to be described.

The rotation of shaft 120 is always in a clockwise direction, as viewed in FIGS. 4, 5 and 6. Such rotation is effected by a pawl or rack 125 engageable with a ratchet gear 130 secured on shaft 120. As best seen in the perspective view of FIG. 7, pawl or rack 125 is a formed stamping of relatively light gauge sheet metal. The major portion of the pawl is angular in cross section to provide a generally vertical leg having an elongated slot 126 of a width somewhat greater than the diameter of shaft 120. An arm 127 extends angularly upwardly and forwardly from this vertical wall and is formed with an aperture at its free end. The horizontal leg of the pawl or rack 125 is formed with a series of rack teeth 128, which are tabs punched and bent out of the horizontal leg to extend downwardly and rearwardly. It will be noted that the teeth of gear 130 are substantially triangular with the radial edges facing toward teeth 128 of pawl 125.

Pawl or rack 125 is operated by universal bar 100 which is extended through the aperture in the outer end of arm 127. When universal bar 100 is moved forwardly, teeth 128 of the pawl ride over the teeth of gear 130, due to engagement with the sloping surfaces thereof as seen, for example, in FIG. 4. The clearance between the horizontal edges of slot 126 and shaft 120 is at least sufficient to provide for such overriding movement. When universal bar or rod 100 is returned to its rest position, pawl 125 is moved rearwardly. During this movement of pawl 125, teeth 128 engage the radial faces of the teeth of gear 130 to rotate this gear, and thus shaft 120, counterclockwise. Through one of the worms 118, one of the gears 117 is rotated and thus imparts a rotation to its connected shaft 115 to take up the ribbon. Felt washers 137 beneath each spool 110 act as friction brakes on the associated spool.

Between the two spools 110, ribbon 129 is guided through the slots in arms 40 and through a vertically movable ribbon guide 135. Ribbon guide 135 is slidably mounted, for vertical movement, upon mounting plate 57 for the type bar basket. In a conventional manner, mounting plate 57 is formed with a pair of guide ears 131 for guiding the type bars into accurately centered position when a key 70 is struck, and a slot is formed extending downwardly from these ears. Ribbon guide 135 is formed with ribbon guiding fingers 132 through which the ribbon extends.

In the normally lower position of ribbon guide 135, the ribbon is displaced away from guide ears 131 so that the typed matter is visible. As a key 70, or space bar 80, is struck, ribbon guide 135 is moved upwardly so that ribbon 129 is positioned in the path of movement of a type bar 60 on a type bar lever 55. This position is shown in FIG. 2 of the drawing. Guide 135 is simply a substantially flat piece of sheet metal which engages the back or rear surface of mounting plate 57 for the type bar basket, and has ears 133 bent around each edge of plate 57 and overlying the front surface thereof. As best seen in FIGS. 2 and 5, plate 57 is formed with an elongated vertically extending slot 134, and guide 135 is formed with an aperture 136 aligned with this slot, both for a purpose to be described.

Carriage assembly

Referring to FIGS. 1, 2, 5 and 9 through 15, the carriage assembly includes a fixed channel shaped track or guide 140 over which is telescoped an inverted channel shaped movable slide 150 constituting the carriage. The base of fixed track 140 is apertured adjacent each end so that it may be secured, by screws or the like, to horizontal ears 44 on each of the side walls of rear bracket 30. Each flange of track 140 is formed, substantially mid-way of its height, with an outwardly facing V-shaped recess 141 extending longitudinally thereof. Correspondingly, the flanges of movable channel slide 150 are formed, intermediate their height, with an inwardly facing V-shaped recess 151 which extends longitudinally thereof, and each recess 151 is aligned with a recess 141. The facing recesses 141 and 151 receive ball bearing assemblies each comprising ball bearings 142 with which may be associated a rectilinear retainer (not shown). Screws 152 (FIG. 1) are threaded through the inner flange of movable slide 150 and serve as abutments to limit relative longitudinal movement of slide 150 along track 140, these screws engaging, for example, the ends of the roller bearing retainers. By means of ball bearings 142, slide 150 and the elements supported thereby are freely movable longitudinally of track 140.

For a purpose to be described, the base of track or carriage guide 140 has a pair of apertured ears 143 struck out therefrom at longitudinally spaced locations, and between these ears there is a substantially rectangular aperture 144 cut from the base. A bell 146 is mounted on the lower surface of the base of track 140 and, associated with this bell, is a spring biased trip hammer 147 which is arranged to be operated to ring bell 146 by a tab 153 on slide 150 as the latter nears the end of a line of type.

The carriage assembly, the elements of which are mounted upon the movable carriage 150, is biased to the left, as viewed from the front of the typewriter, so that under the control of the escapement mechanism, the carriage assembly will "step" to the left each time a key 70 or space bar 80 is operated. The biasing means comprises a relatively elongated coil spring 145 which has one end hooked to a lug 154 on the movable slide or carriage 150. A grooved pulley 148 is rotatably mounted in the left-hand apertured ear 41 extending from wall 35 of the rear bracket, and spring 145 is trained around pulley 148 and its opposite end is hooked to the lug 42 projecting from the right-hand end wall 35 of the rear bracket, as best seen in FIG. 9.

The base of movable slide 150 has ears 156 extended from each end thereof and bent vertically upward. These ears are apertured in alignment with each other to receive the pivots for a cylindrical platen 155, and the outer ends of the ears are substantially circular and flanged to partially overlie the platen. A plastic knob 157 is secured to each end of the platen shaft for rotating the same to set and advance the paper. A coil spring 158 is engaged between the right-hand ear 156 and the right-hand knob 157 to act as a frictional lock to maintain platen 155 in adjusted position.

A sheet metal paper guide 160 is provided, having a transversely arcuate portion closely embracing platen 155. Adjacent its forward edge, and at other locations if desired, guide 160 is formed with longitudinally extending slots 161 having ears adjacent each end rotatably supporting a small diameter rubber roller 162. These rollers

engage the paper and maintain it firmly engaged with platen 160. Intermediate its front and rear edges, paper guide 160 is pivoted to ears 156 as by means of small tabs (not shown) projecting through apertures in ears 156. One or more springs 163, connected between lugs struck from the rear surface of paper guide 160 and lugs struck from the base of the slide 150, bias paper guide 160 in a clockwise direction, as viewed in FIG. 2, to maintain roller or rollers 162 in engagement with platen 155.

The upper rear edge of paper guide 160 is bent back on itself, as at 164, to form a bearing for the reentrant ends of a paper holding wire 165 which normally engages platen 155 a little bit forwardly of its uppermost point and extends therealong to guide a paper around the platen. A coil spring 166 (FIG. 1) biases paper wire 165 into engagement with platen 155. Reentrant edge 164 also forms an easy to use "handle" for manual operation to swing paper guide 160 counterclockwise, as viewed in FIG. 2, to allow insertion and adjustment of paper between platen 155 and paper guide 160.

A bracket 149 is secured to the left ear 156 and has a horizontally extending apertured upper ear 159 which pivotally supports a horizontally swingable angle lever 170 utilized for step by step rotation of the platen and return of the carriage assembly to the right at the end of each line. Interengageable stops on ear 159 and lever 170 limit movement of lever 170 in one direction. A wire link 167 interconnects lever 170 to a pawl and ratchet mechanism, generally indicated at 168, for such step by step rotation of platen 155.

Escapement mechanism

Referring to FIGS. 2, 5 and 9 through 16, the escapement mechanism for the typewriter includes a rack 175 movable with slide 150 and cooperable with a pawl mechanism generally indicated at 180 and operated by movement of the universal bar or rod 100. In a manner to be described more specifically hereinafter, pawl mechanism 180 is oscillatably mounted in apertured ears 143 of track or carriage guide 140 and extends across rectangular aperture 144 in the base of track 140. Pawl mechanism 180 is oscillated by means of a crank 185 described more fully hereinafter, and crank 185 is connected to universal bar 100 by means of a pair of off-set links 171 each apertured at one end to receive bar 100 and at the other end to extend over the ends 183 of crank 185.

Links 171 are retained against displacement longitudinally of universal bar 100 by virtue of being inside of end walls 26 of front bracket 25. The rear ends of links 171 may be slipped over the ends of crank 185 and are retained from disengagement therefrom by means of ears 172 struck up from support base 20 and each located, with clearance, outwardly of a link 171. As described hereinafter, the arrangement is such that each time universal bar 100 is moved sideways by operation of a key 70 or space bar 80, crank member 185 is oscillated and this actuates the escapement mechanism.

Escapement rack 175 is an essentially flat piece of metal having a base 176 formed with a reinforcing rib 177 therealong, as best seen in FIG. 12. A lip 178 is bent down along one edge of base 176 and formed with sawtooth ratchet teeth 190 whose left faces, as viewed from the front of the typewriter, are vertical and whose right faces are sloping. The opposite ends of rack 175 are bent upwardly, as at 173, and are outwardly off-set, the free ends of the upwardly bent portions 173 being provided with outwardly projecting thumb pieces 174. Ears 173 are pivoted to one ear 156 and the bracket 149, respectively, as indicated at 179. Thereby, the rack 175 may be swung counterclockwise, as viewed in FIG. 12, to disengage teeth 190 from pawl mechanism 180. However, a coil spring (not shown) operates on one ear 173 and rack 175 to bias rack 175 to the position indicated in solid lines in FIG. 12. For free movement of the carriage, one or the other of thumb pieces 174 is lifted and the rack mechanism is swung to the dotted line position of FIG. 12. By virtue of disengagement of teeth 190 from pawl mechanism 180, movable carriage slide 150 may be moved freely relative to the fixed track 140, within the limits of movement.

As best seen in FIG. 9, escapement operating crank 185 is a relatively elongated circular cross section rod which is bent, adjacent each end, to form two rectangular U-shaped off-sets providing pivot axes 181 which lie in and extend through the slots 43 between horizontal ears 44 of rear bracket 30. These two off-sets provide a relatively elongated central crank section 182 extending between the two off-sets, and crank ends 183 which are engaged through apertures in the rear ends of links 170. Central crank section 182 serves to oscillate pawl mechanism 180 each time universal bar or rod 100 is moved forwardly and returned.

Referring to FIGS. 9 through 16, pawl mechanism 180 includes a generally channel shaped bracket 184 having a base 186 and flanges 187 and 188. The normally vertical free edges of flanges 187 and 188 have ears which are extendible through slots in a generally channel shaped cover plate 189, arranged to embrace flanges 187 and 188, with these ears being bent over to secure cover plate 189 to bracket 184. Flanges 187 and 188 are formed with aligned apertures 191 which receive a bolt and nut assembly 192 extending through the apertures in ears 143 and serving as a pivot for oscillation of pawl mechanism 180. A spacer 193 surrounds the bolt and nut assembly 192 to space flange 188 from the adjacent ear 143, and a coil spring 194 surrounds the bolt assembly between flange 187 and the adjacent ear 143 to space this flange from the adjacent ear and to bias pawl mechanism 180 to the left, as viewed in FIG. 10. Flange 188 is formed with a downwardly opening vertical slot 196 in alignment with pivot 192 and arranged to engage central portion 182 of escapement crank 185. The upper end of flange 188 has extending therefrom an ear 195 which has a perpendicular face toward base 186 and a curved face toward cover 189. For reference purposes, ear 195 will be referred to as the "fixed pawl" or "first pawl."

Base 186 of bracket 184 is formed with a horizontal slot 197 adjacent its upper end receiving a headed pivot 198. Pivot 198 serves as an oscillation pivot for a movable pawl carrier plate 200 which is generally triangular. An ear 199 bent from the upper edge of base 186 limits movement of carrier plate 200 in a counterclockwise direction as viewed in FIG. 16. Carrier plate 200 is formed with a horizontal arm 201 extending through vertical slot 202 at the intersection of base 186 and flange 188. A second horizontal arm 203 is bent inwardly from the plate 200 and is formed with an anchor for a tension spring 204. The other end of spring 204 is anchored to the operating rod or wire 205 for the movable ribbon guide 135.

Wire 205 has an off-set end 206 anchored through an aperture in flange 188. The remainder of the rod is rectilinear and extends outwardly through an aperture 207 in cover plate 189 and through aperture 136 in ribbon guide 135 and slot 134 in mounting or support plate for the type basket. Spring 204 biases carrier plate 200 in the counterclockwise direction.

Plate 200 has an upwardly extending projection 211 from which there is bent an ear 210, hereinafter referred to, for reference, as the "movable pawl" or "second pawl." Pawl 210 extends parallel to fixed pawl 195, and is spaced therefrom, longitudinally of the carriage assembly, by a spacing slightly less than the distance between the vertical faces of three teeth 190. This is best illustrated in FIG. 10. Also, and as best seen in FIGS. 12 and 14, fixed pawl 195 and movable pawl 210 overlap each other a relatively small amount in a direction transversely of the carriage assembly.

Normally, pawl 210 is engaged with the vertical face of a tooth 190. When pawl mechanism 180 is rocked

in a clockwise direction, as viewed in FIG. 12, fixed pawl **195** will be moved into position to engage the vertical face of a tooth **190** before movable pawl **210** disengages the vertical face of its associated tooth **190**. Thus, there will be only a slight movement to the left of the carriage during such clockwise rocking of pawl mechanism **180**. As the pawl mechanism is rocked back to the perpendicular position of FIG. 12, the less than 3-teeth spacing of the two pawls will result in movable pawl **210** being positioned in advance of the vertical face of the next tooth **190** to the right of that previously engaged and, as fixed pawl **195** disengages its tooth **190**, the carriage will be moved to the left by an amount slightly less than the spacing between two adjacent teeth **190**, and will be stopped in this position by engagement of a tooth **190** by movable pawl **210**.

It should be noted that the carriage assembly, including the pawl mechanism and associated parts, may be assembled as a unit before being placed on the typewriter. In placing the carriage assembly on the typewriter, it is merely necessary to align slot **196** with central crank portion **182** of escapement crank **185**, and then to secure track **140** to support ears **44**. This greatly facilitates assembly of the typewriter, as all that is needed, following this operation, is to attach spring **145** at one end to hook **154**, extend it around pulley **148**, and attach the other end to hook **42**.

Résumé of operation

When a typing key **70** is depressed, its associated bell crank **75** is rocked counterclockwise, as viewed in FIG. 2. This will move universal bar or rod **100** to the left, as viewed in FIG. 2, along slots **27**. The same action takes place whenever space bar **80** is depressed, as the upward extensions **83** of its levers **81** will likewise move universal bar **100** to the left in slots **27**.

The movement of universal bar **100** to the left in slots **27** effects a number of operations. Through link **127** of ratchet **125**, ratchet wheel **130** and shaft **120** are rotated counterclockwise, and one or the other worm gears **117** is rotated to rotate its associated shaft **115** and ribbon spool **110** to advance the ribbon.

The second operation occurs through the movement of links **171**. This rocks escapement crank **185** which rocks pawl mechanism **180** clockwise as viewed in FIG. 12. Through wire **205**, movable ribbon guide **135** is then elevated to the typing position for engagement by a type bar **60** of a type lever **55**. Also, such clockwise rocking of escapement mechanism **180** disengages movable pawl **210** from its associated tooth **190** of rack **175** and engages fixed pawl **195** with a tooth, after a short movement of the rack to the left. Under the bias of a spring **212**, connected between central portion **182** of escapement crank **185** and a rear portion of rear bracket **30**, pawl mechanism **180** is biased to the position shown in solid lines in FIG. 12. Thus, as a key **70** or the space bar **80** is released, pawl mechanism **180** is biased back to its vertical position wherein fixed pawl **195** releases a tooth and movable pawl **210** engages the next adjacent tooth to the right of that previously engaged. The resultant counterclockwise rotation of escapement crank **185**, through links **171**, moves universal rod or bar **100** to the right in slots **27**. In turn, the counterclockwise rotation of pawl mechanism **180**, through wire **205**, lowers movable ribbon guide **135**.

As has been previously described, depression of either one of the "shift" levers through either one of its two operating buttons **86**, lowers the type bar basket as a unit in order to type the "upper case" characters. Free movement of carriage **150** in either direction may be effected by grasping thumb pieces **174** of levers **173** and lifting them from the solid line position to the dotted line position of FIG. 12. This disengages rack teeth **190** from pawl mechansm **180** to provide for free longitudinal adjustment of the carriage assembly. A change in direction of the ribbon feed can be effected readily by moving operating button **121** either forwardly or rearwardly, depending upon its initial position. This will disengage one worm **118** from its gear **117** and engage the other worm **118** with its gear **117**. Furthermore, ready adjustment of the paper around the platen can be effected by swinging paper guide **160** clockwise, as viewed in FIG. 2, thereby releasing rollers **162** from the paper so that the latter may be readily adjusted.

FIGS. 18 through 22 illustrate the typewriter shown in FIGS. 1 through 17 as slightly modified to incorporate a back spacing mechanism. Referring first to FIGS. 18 and 19, a back space key lever **215** has its operating head **220** positioned adjacent the inner left-hand corner of keyboard **45**, to the left of the inner or third row of typing keys **70C**. Back space lever **215** is pivotally mounted upon left-hand upright arm **26'** of bracket **25** which, for this purpose, is modified to receive a pivot **216**, for lever **215**, and a stop pin **217**. Lever **215** is an essentially flat stamping of sheet metal, stamped to provide a forward angle portion **218** and a rear angle portion **219**. Operating button or back space key **220** is set on the upwardly extending portion of forward angle section **218**.

The rear end of the rear angle portion **219** carries a pivot pin and spacer arrangement **221** which is slidably engaged in a diagonal slot **222** in the forward end of what may be termed an intermediate side link or lever **225** which is pivoted, intermediate its ends, on an L-shaped bracket **223** secured to base **20** adjacent the left side thereof and just forwardly of rear bracket **30**. Intermediate side lever **225** has a forward inwardly off-set portion **224** and a rearwardly extending arm **226**, off-set portion **224** being formed with the slot **222**. Side lever **225** is a flat metal stamping formed to have an upwardly off-set and rearwardly extending operating end **227**.

Adjacent operating end **227** of lever or link **225**, left side wall **35'** of rear bracket **30** is formed with a vertically extending slot **228**. Referring to FIGS. 20 through 22, adjacent left side wall **35'** of bracket **30**, the rear wall **33'** thereof is apertured to receive a pivot pin **231** surrounded by a spacer **232** and pivotally mounting an engaging lever **230**. Engaging lever **230** is an essentially flat stamping of metal which is T-shape in plan including a stem **233** extending through slot **228** and having its outer end twisted, as at **234**, to extend substantially horizontally and to engage beneath operating end **227** of intermediate side lever **225**. Lever **230** is engaged by its pivot **231** at a pivot axis which is spaced somewhat above the junction of its stem **233** and its head **236**. The upwardly extending portion of head **236** is notched, as at **237**, to anchor one end of a tension spring **235**.

A rack engaging and pushing lever **240** has its outer end pivotally secured to the lower extension of head **236** of lever **230**, as indicated at **238**. Lever **240** is generally L-shaped in elevation, and comprises a piece of sheet metal stamped and formed to provide a generally horizontal and relatively long arm **241** and a generally vertical arm **242**. A flange **243** is bent inwardly at a right angle from the free outer edge of arm **242**, and it will be noted that arm **242** has a bent portion **245** projecting upwardly through the aperture **244** in track **140** formed by cutting and bending ear **143** from the base of the track. Flange **243** is continued part way along bent upper end **245** of arm **242**. The other end of tension spring **235** is hooked into an aperture **246** in horizontal arm **241** of lever **240**, this aperture being located substantially midway of the length of arm **241**.

It will be noted that engaging and pushing lever **240** is freely pivotally mounted upon the lower end of head **236** of lever **230**. Tension spring **235** tends to bias lever **240** clockwise and lever **230** counterclockwise. In the normal position of the parts, as illustrated in FIG. 20, bent portion **245** of arm **242** of lever **240** engages the

bend line of ear **143**, with finger **245** and a part of flange **243** extending into aperture **244**. In this position of the parts, there is a resistance to the clockwise rotation of lever **240** about its pivot **238**, so that lever **230** is biased counterclockwise, lifting end **227** of intermediate side lever **225** and, through the connected linkage, elevating operating key **220** of back space lever **215**. The upper end of flange **243** is disposed somewhat beneath teeth **190** of rack **175**.

When key **220** of back space lever **215** is depressed, this lever is swung clockwise, as viewed in FIGS. 18 and 19, to the position of FIG. 19. This swings intermediate side lever **225** counterclockwise so that operating end **227** thereof moves finger **234** of lever **230** downwardly in slot **228**. This swings lever **230** clockwise from the position shown in FIG. 20 to the position shown in FIG. 21.

Due to the tension of spring **235**, the first result of the clockwise movement of lever **230** is to move engaging and push lever **240** clockwise with bent portion **245** of arm **242** of lever **240** sliding upwardly due to its angular relation with the intersection of ear **143** and the base of track **140**. This moves flange **243** upwardly between a pair of teeth **190** of rack **175**. After a very short movement, such upward movement is halted by engagement of the upper end of flange **243** with rack **175**, so that lever **240** can no longer move clockwise.

Upon further movement of lever **230** clockwise, due to operating end **227** of intermediate side lever **225** moving downwardly, lever **240** is shifted bodily to the left, as viewed in FIGS. 20 and 21. During this motion, flange **243**, in engagement with a perpendicular face of an adjacent tooth **190** of rack **175**, moves rack **175** to the left a distance equivalent to about 1.5 times the spacing of teeth **190**. Such motion is equivalent to a return motion of the carriage, so that pawl mechanism **180** will slip over the sloping surfaces of teeth **190**. As back space key **220** is released, the parts are returned, under spring bias, to the positions shown in FIGS. 18 and 20, wherein flange **243** is disengaged from teeth **190**. Rack **175** is locked in its newly adjusted position by pawl mechanism **180**, and there will be a very slight movement to the left of rack **175** until the rack teeth engage movable pawl **210** of pawl mechanism **180**.

While a specific embodiment of the invention has been shown and described in detail to illustrate the application of the principles of the invention, it will be understood that the invention may be embodied otherwise without departing from such principles.

What is claimed is:

1. A typewriter comprising, in combination, a support base; a keyboard including typing key levers; a type bar basket; pivotally mounted bell cranks connecting respective typing key levers to respective type bars of said type bar basket; and guiding and spacing means for said typing key levers and said bell cranks; said guiding means including a comb extending transversely of said base, rearwardly of said keyboard; said base comprising a sheet of metal bent to form a forward wall extending upwardly of said base, a top wall extending substantially parallel to said base, and a rear wall extending downwardly from said top wall to said base; said front and top walls being formed with a plurality of slots equal in number to the number of typing key levers and to the number of associated bell cranks, said slots being closed end slots and extending upwardly in said front wall and rearwardly into said top wall; the portions of said slots in said front wall being wider than the portions thereof in said top wall; the portions of said slots in said front wall each receiving a typing key lever and one arm of its associated bell crank, with clearance; the portion of each slot in said top wall receiving, with clearance, the normally upwardly extending arm of a bell crank; said bell cranks being pivotally mounted on a shaft extending longitudinally through said comb and mounted in walls extending upwardly from the base at opposite ends of said comb, said walls at opposite ends of said comb being parallel to each other and each formed with a substantially horizontal slot, with the two slots being aligned; a rod extending longitudinally of said comb top wall and having its ends engaged through said slots, said rod being engaged with that arm of each bell crank which is connected to a type bar; whereby, upon operation of a typing key lever, said rod will be displaced bodily along said slots while extending parallel to its original position; a carriage moveably mounted transversely of said base; escapement mechanism controlling movement of said carriage in one direction transversely of said base; and linkage means inter-connecting both ends of said rod and said escapement mechanism; said linkage means including a transversely pivoted elongated crank proximate to said escapement mechanism and cooperating therewith, and a pair of links, each being connected, at opposite ends, to one end of said elongated crank and a corresponding end of said rod extending longitudinally of said comb.

2. For use in a typewriter having a frame, an escapement mechanism comprising a sawtooth rack adapted to extend longitudinally of a carriage of the typewriter, and a pawl mechanism mounted for oscillation about an axis parallel to said rack, said pawl mechanism including a bracket pivoted to said frame on said axis parallel to said rack and having a first normally vertical wall extending perpendicular to said axis and a second normally vertical wall extending parallel to said axis; a first pawl projecting upwardly from said first wall for engagement with the teeth of said rack, and normally disengaged from said teeth; a carrier plate slideably mounted on said second wall and having projecting therefrom a second pawl normally in engagement with said sawteeth; said carrier plate being slideable in a direction parallel to said axis and including means cooperating with said bracket for limiting the sliding movement thereof to a distance approximating the distance between adjacent teeth, and spring biasing means acting on said carrier plate to normally urge said second pawl toward said first pawl; said pawls extending parallel to each other, and normal to the direction of movement of said rack, and said pawls extending into overlapping relation transversely of said rack whereby, as said second pawl is disengaged from said rack said first pawl will be moved into engagement with said rack, and as said first pawl is disengaged from said rack said second pawl will be moved into engagement with said rack; said pawls being spaced from each other, in a direction parallel to the travel of said rack.

3. A typewriter comprising, in combination, a frame including a support base; a keyboard including typing key levers; a carriage guide extending laterally of said base; a carriage displaceable along said guide; means biasing said carriage in one direction along said guide; an escapement mechanism controlling stepwise displacement of said carriage in said one direction; a platen on said carriage; means operatively interconnecting said typing key levers and said escapement mechanism whereby, responsive to each actuation of a typing key lever, said escapement mechanism is operated to provide for stepped movement of said carriage along said guide under the influence of said biasing means; said escapement mechanism comprising a sawtooth rack extending longitudinally of said carriage, and a pawl mechanism oscillatably mounted on said carriage guide for oscillation about an axis parallel to said rack; said pawl mechanism including a bracket pivoted to said frame on said axis parallel to said rack and having a first normally vertical wall extending perpendicular to said axis and a second normally vertical wall extending parallel to said axis; a first pawl projecting upwardly from said first wall for engagement with the teeth of said rack, and normally disengaged from said teeth; a carrier plate slideably mounted on said second wall and having projecting therefrom a second pawl

normally in engagement with said sawteeth; said carrier plate being slideable in a direction parallel to said axis and including means cooperating with said bracket for limiting the sliding movement thereof to a distance approximating the distance between adjacent teeth, and spring biasing means acting on said carrier plate to normally urge said second pawl toward said first pawl; said pawls extending parallel to each other and normal to the direction of movement of said rack, and said pawls extending into overlapping relation transversely of said rack whereby, as said second pawl is disengaged from said rack said first pawl will be moved into engagement with said rack; said pawls being spaced from each other, in a direction parallel to the travel of said rack; whereby, as said pawl mechanism is oscillated in one direction responsive to a typing key lever actuation, said second pawl will disengage its engaged rack tooth and slide toward said first pawl under the urging of said spring biasing means, and said first pawl will move into the path of a rack tooth to allow a slight movement of the carriage from right to left as viewed from the front of the typewriter and, as the typing key lever is released, the reverse oscillation of said pawl mechanism will move said second pawl into position to engage the tooth adjacent the one previously engaged and, as said first pawl is disengaged from said rack, said carriage and said second pawl will move the balance of the distance between two rack teeth from right to left in response to said carriage biasing means.

4. A typewriter comprising, in combination, a support base; a keyboard including typing key levers; a type bar basket; pivotally mounted bell cranks connecting respective typing key levers to respective type bars of said type bar basket; guiding and spacing means for said typing key levers and said bell cranks, said guiding and spacing means including an elongated comb extending transversely of said base rearwardly of said keyboard and said comb having a pair of opposed end walls parallel to each other and respectively formed with substantially horizontal slots which are in alignment with each other; a carriage movable transversely of said base; escapement mechanism controlling movement of said carriage in one direction transversely of said base; and an assembly for actuating said escapement mechanism in response to turning of said bell cranks, said assembly including a rod extending longitudinally of said comb and having ends respectively extending through said slots, said rod being guided by said slots for horizontal movement while remaining parallel to its original position, and said rod being engaged by that arm of each bell crank which is connected to a type bar, so that upon operation of a typing key lever said rod will be displaced bodily along said slots while remaining parallel to its original position, and said assembly further including a linkage means interconnecting both ends of said rod and said escapement mechanism, said linkage means including a transversely pivoted elongated crank proximate to said escapement mechanism and cooperating therewith, and a pair of links, each being connected, at opposite ends, to one end of said elongated crank and a corresponding end of said rod extending longitudinally of said comb.

5. A typewriter, as claimed in claim 3, in which said carriage guide comprises a bracket having a pair of upright walls at each end thereof, each wall having an outwardly directed pair of ears at its upper end formed with a slot therebetween; a crank rod extending longitudinally of said bracket and including a central crank section having a length substantially equal to the spacing between said two upright walls of said bracket, a pair of substantially rectangular U-shaped off-sets at the ends of said central crank section each having a bight parallel to said central crank section and lying in said slots between said ears to form a pivot axis for said crank, and a pair of crank ends extending coaxially with said central section and lying outside of said upright walls; and a pair of links engaged with said laterally displaceable rod and with said crank ends; said first wall of said pawl mechanism bracket having a notch in its lower edge engageable with the central section of said crank rod; said links forming part of said means interconnecting said typing key levers and said escapement mechanism.

6. A typewriter, as claimed in claim 5, in which said support base is a substantially flat sheet metal base; the ends of said links being maintained in engagement with said crank ends by ears cut and bent upwardly from said support base and lying outside of said links to limit displacement thereof outwardly of said crank ends.

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