June 1, 1943. F. M. CARROLL 2,320,810

TYPEWRITING MACHINE

Filed Sept. 18, 1941 2 Sheets-Sheet 1

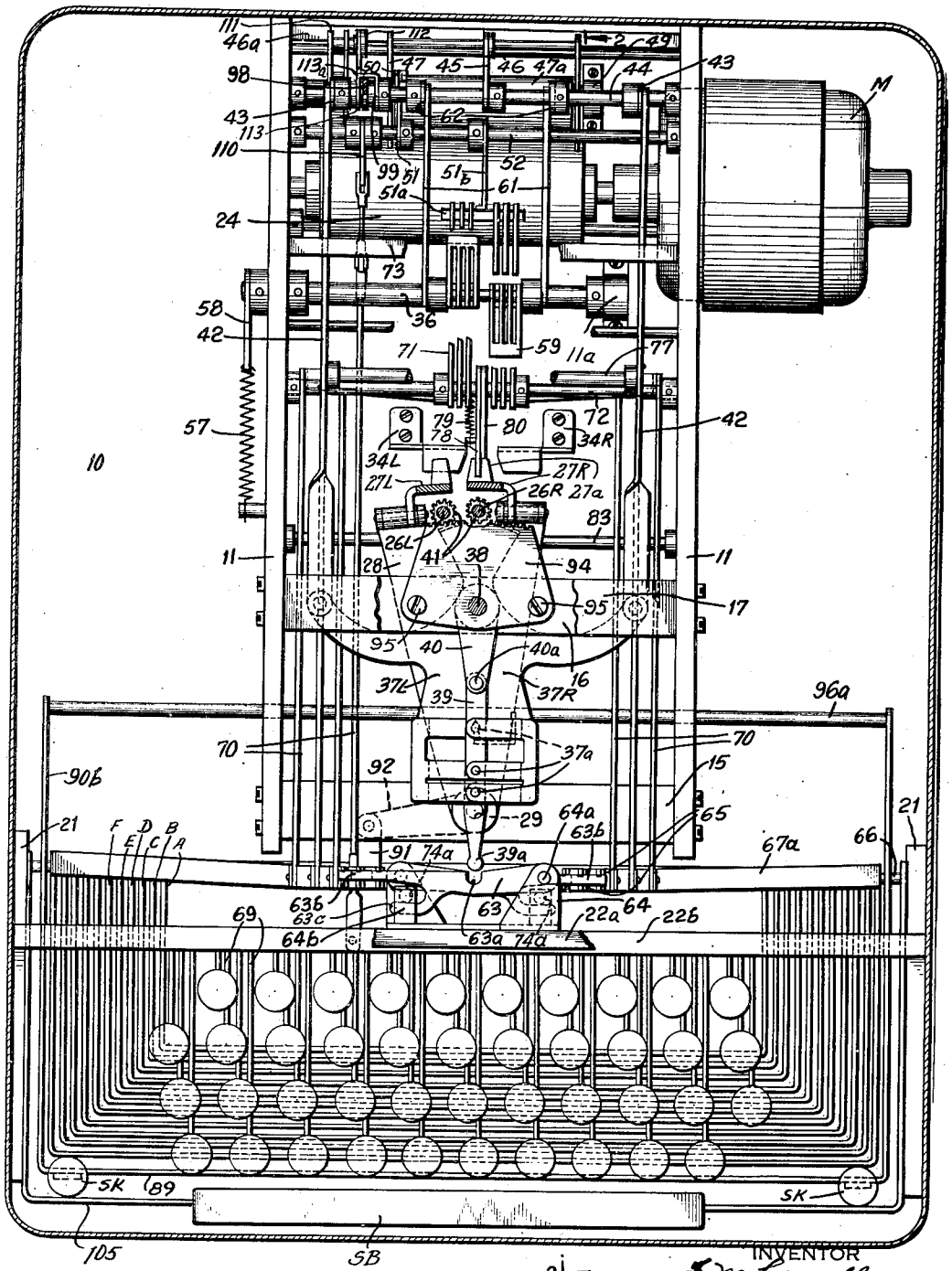


FIG. 1.

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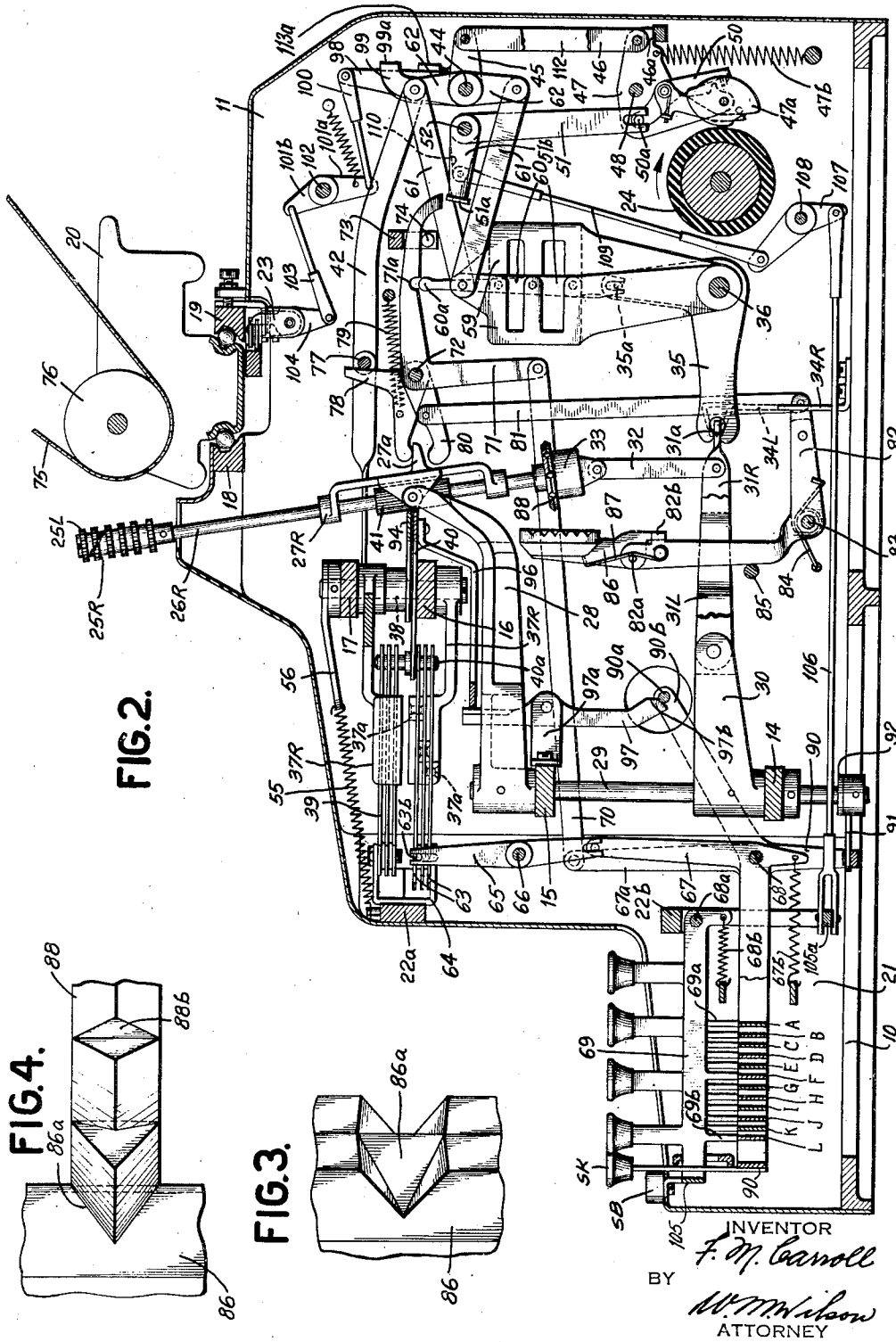


FIG. 2.

FIG. 4.

FIG. 3.

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2,320,810

TYPEWRITING MACHINE

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Application September 18, 1941, Serial No. 411,306

23 Claims. (Cl. 197—16)

This invention relates to typewriting machines.

An object of the present invention is to provide an improved power operated typewriter.

Another object is to provide a power operated means for selectively rotating a type wheel.

An object is to provide a power operated mechanism for actuating a type wheel which requires only one power operator instead of a plurality, one for each character, as is more commonly the case.

An object is to provide a novel selecting mechanism for controlling the operation of a type wheel.

An object is to provide a typewriter with a plurality of type wheels and mechanism to select either of the type wheels for operation at the will of the operator.

An object is to provide a typewriting mechanism which may be operated by a single cam unit of the type disclosed in Patent No. 1,777,055.

Other objects of the invention will be pointed out in the following description and claims and illustrated in the accompanying drawings, which disclose, by way of example, the principle of the invention and the best mode, which has been contemplated, of applying that principle.

In the drawings:

Fig. 1 is a plan view of the machine with portions of the cabinet cut away and with the carriage removed.

Fig. 2 is a vertical section on the line 2—2 of Fig. 1.

Fig. 3 is a large scale detail view of the aligning member.

Fig. 4 is a large scale detail view showing the aligning member and disc in engaged position.

The main frame work comprises a rectangular base 10 on which is mounted in parallel spaced relationship two vertical central frames 11 which support the printing mechanism and carriage. These frames 11 are rigidly joined together by cross members 14, 15, on which are pivotally mounted the members supporting the type elements; cross frames 16 and 17, supporting the type element rotating members; and the carriage rails 18 and 19 on which the carriage 20 is mounted in a well known way by means of suitable anti-friction bearings. Two supplemental side frames 21 are also provided at the front end of base 10, which frames 21 are joined together by bars 22a, 22b.

The carriage 20 may be of the form used in the well known "Electromatic" typewriter which has also been known as the "International," but any other suitable form of carriage may be used equally as well. Upon the rear rail 19 is mounted the usual escapement mechanism generally designated 23, which may be of the form shown in U. S. Patent No. 1,994,544.

The machine is operated by a suitable electric motor M (Fig. 1) which is coupled in any suitable way to a power roller 24 driven continually by the motor M in the direction of the arrow (Fig. 2). One end of the power roller 24 is supported by the motor M while the other end of the power roller is journaled in left hand vertical frame plate 11. The right hand frame plate 11 is provided with a suitable opening to accommodate the frame of the motor M. This power roller provides the means for operating all of the mechanisms of the typewriter.

Printing is effected by means of two rotatable type elements like right hand element 25R, each provided with six annular rows of type characters of which there are seven types in each row. These type elements are secured to the upper ends of shafts 26R, 26L which are journaled in frame castings 27R, 27L (Fig. 1) each provided with an ear which pivotally connects the frame casting 27R or 27L to an arm 28. This arm is bifurcated to allow free pivotal movement of the frames 27R, 27L and the shafts 26R, 26L. The arm 28 is secured to a vertical shaft 29 journaled in the frame cross members 14, 15. An arm 30 is secured to the shaft 29 directly underneath the arm 28, but is approximately half the length of the latter. Pivoted to the arm 30 are two support arms 31R, 31L which are pivotally connected by links 32 to socket bearing members 33 attached to the lower ends of shafts 26R, 26L. Construction of the bearing members 33 is such that the shafts 26R, 26L are freely rotatable therein, but are incapable of withdrawal from the bearing members whereby the raising or lowering of the arms 31R, 31L will result in raising or lowering the corresponding shafts 26R, 26L. This operation is performed selectively under control of the keys and will be explained hereinafter.

The arms 31R, 31L are twisted to form flattened lugs 31*a* of which the lug for the shaft 26L, as shown in Fig. 1, is supported in a narrow channel formed in a bracket 34L secured to the frame or base 10. The lug 31*a* for the arm 31R, corresponding to the shaft 26R, is loosely received in a bifurcation formed in the horizontal arm of a bell crank 35 secured to a shaft 36 supported by the left hand frame 11 (Fig. 1) and a bearing 11*a*. Thus both typewheels 25R, 25L are supported at all times and one of them may always be moved vertically by rocking the bell crank 35 in either direction (Fig. 2). When the arm 30 is moved horizontally about the shaft 29 as an axis, or clockwise in Fig. 1, the lug 31*a* on the right hand arm 31R will be moved into the channel in a bracket 34R similar to bracket 34L, while the lug 31*a* on the left hand arm 31L will be moved into the bifurcation in the arm 35. Thus one or the other of the two typewheels 25R, 25L may be selected for a printing operation which involves selective rotation of the typewheel, selective axial movement, and a rocking movement to effect printing by the type which was selected by the first two movements.

Normally the type element 25R or 25L which is in printing position remains in a central position with respect to both rotational movement and axial movement, but is movable three extents away from the central position both rotationally and axially. These two movements are effected by similar mechanisms under control of the character keys. The operation of the two mechanisms for effecting the selection of the characters on the type elements is best understood with reference to the one which effects rotation of the typewheel. This mechanism is mainly supported by frame members 16, 17 and comprises a pair of rocking frames designated 37R, 37L which are substantially identical in construction and are rotatably mounted on a stub shaft 38 journaled in the frame members 16, 17. The frame members 37R, 37L are each formed with three horizontal parallel slots extending radially on the shaft 38 in which slots are pivotally mounted three levers 39. The ends of the levers 39 nearest shaft 38 are slotted to provide a pivotal sliding connection to a long pin 40*a* on an arm formed in a gear sector 40 which is fixed on the shaft 38. This gear sector normally meshes with one or the other of long pinions 41 secured to the shafts 26R, 26L.

The frame members 37R, 37L are provided with arms which extend to right and left, respectively (Fig. 1), underneath cross member 17 and are pivotally connected to links 42 which extend horizontally to the rear of the machine and are in turn pivotally connected to arms 43 secured to a shaft 44. The shaft 44 is journaled in the frame plates 11 and is provided with an arm 45 (see Fig. 2 also) connected by link 46 to a cam unit 47 which is pivotally mounted on a cross rod 48 supported by the frame 11 and by a bearing bracket 49 attached to the base 10. The cam unit 47 is constructed according to a principle well known in the art and explained in Patent No. 1,777,055, but in the present case the side frames of the cam unit are widely separated and rotatably support a long cam 47*a* instead of a narrow cam as in the above patent.

Cam 47*a* is controlled by a release lever 50, as in the above patent, which lever is provided with a pin 50*a* received in a slot in the end of an arm 51 fixed on a cross shaft 52 carried by the frame plates 11. When the arm 51 is rocked in a counterclockwise direction (Fig. 2) the release lever 50 is rotated in the opposite direction to release the cam 47*a* which, in a well known way, is rotated slightly by spring means to engage power roller 24 and is subsequently rotated by the latter. Rotation of the cam 47*a* of the power roller 24 results in cam unit 47 rocking in a counterclockwise direction (Fig. 2) thereby raising link 46 and rocking shaft 44 in a counterclockwise direction against the tension of restoring spring 47*b*. This operation causes the links 42 to move to the left (Fig. 2) or downwardly in Fig. 1, thereby rocking the frame 37R clockwise and the frame 37L counterclockwise. Normally spring 47*b* holds the cam unit against a stop bar 46*a*.

The three levers 39 of each frame 37R, 37L are pivotally mounted at 37*a* intermediate their ends three different distances from the center of shaft 38 and, if any one of them is held at its left hand end (Fig. 2), the shaft 26R or 26L, whichever is operative, will be rotated either clockwise or counterclockwise (Fig. 1) three different extents in either direction depending upon which of the levers 39 is held.

The two assemblies comprising frames 37R, 37L and their levers 39 are identical but reversed on shaft 38 so that the lowest of the six levers 39 in Fig. 2 and the highest have the same effect except for the direction of motion imparted to sector 40. For example, the lowest lever 39 in Fig. 2, when held against movement at its rounded left hand end 39*a* and its pivot 37*a* is moved a fixed distance, acts as a lever of the third class and the right hand end will be moved a greater extent than the lever immediately above it, whereby the operative type wheel 25R or 25L will be turned a maximum extent, or three spaces, from the central position in a clockwise direction with reference to Fig. 1. The third lever from the bottom will move the least extent and the type wheel 25R will be rotated clockwise with reference to Fig. 1 only one character space away from the central position. Similarly, the topmost lever 39 (Fig. 2) will rotate the type wheel the maximum extent in a counterclockwise direction with reference to Fig. 1. Normally the gear sector 40 is held in a neutral or central position by means of a spring 55 (Fig. 2) anchored to a pin carried by the cross bar 22*a* and to an arm 56 secured to the upper end of the stub shaft 38. A similar spring 57 and arm 58 secured to the shaft 36 hold the horizontal arm of bell crank 35 (Fig. 1) in a neutral or horizontal position.

For the purpose of selectively positioning the bell crank 35 to raise or lower the type wheel 25R (Fig. 2), there are provided two members 59 like members 37R, 37L rockably mounted in the same way on shaft 36 and provided with levers 60 similar to the levers 39. The levers 60 are bifurcated at their lower ends to provide a pivotal sliding connection to a long pin 35*a* like the pin 40*a* carried by the vertically extending arm of the bell crank 35. The frames 59 are connected by links 61 to arms 62 secured to the shaft 44 which, it will be recalled, is rocked counterclockwise whenever the cam unit 47 is operative. When the levers 60 are selectively held at their rounded ends 60*a*, the bell crank 35 will be rocked one of three extents, either clockwise or counterclockwise (Fig. 2), according to which of the levers 60 is selected.

For the purpose of controlling the levers 39, there is provided a series of detent levers 63 (Fig. 1) which are pivotally mounted at 64*a* in a bracket 64 secured to the rear face of cross bar 22*a*, three of the levers 63 being mounted at the lower left hand corner of the bracket 64 and the

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remaining three at the upper right hand end. Each lever **63** has a notch **63***a* designed to receive and act as a socket for the rounded end **39***a* of a lever **39** when the notched end of such lever **63** is rocked rearwardly of the keyboard. The levers **63** are formed with narrow portions **63***b* (Fig. 1) which extend into slots formed in six rock levers **65** (Fig. 2) journaled on a rod **66** supported by the frame members **21**. The lower ends of the rock levers **65** are slotted to embrace pins carried by six upstanding arms **67**, forming part of six bails designated A to F, respectively, pivoted on a rod **68** and extending underneath the key levers **69** of the keyboard. Bails A to F are restored by springs **67***b*.

The keys **69** are pivoted on a rod **68***a* (Fig. 2) supported by the bar **22***b*, which is also slotted to separate the key levers **69**, and are restored by springs **68***b*. Most of the keys are formed with selector lugs **69***a* which are disposed different distances from the rod **69** and register with the bails A to F according to a system explained hereinafter. Whenever a key having a lug **69***a* registering with one of the bails A to F is depressed, the corresponding vertical arm **67** will be rocked counterclockwise (Fig. 2), thereby rocking the lever **65** to which it is connected in a clockwise direction. This will cause the free end of the corresponding lever **63** to be rocked rearwardly (Fig. 1) to seat the rounded end **39***a* of the corresponding lever **39** in the notch **63***a*. Subsequently the cam unit **47** will be caused to be operated by means to be described hereinafter and both of the frames **37R**, **37L** will be rocked as explained above, thereby applying an actuating force to the selected lever **39** at its pivot **37***a*. This, of course, will cause the operative type wheel **25R** or **25L** to be rotated in the proper direction to partly select the type corresponding to the key depressed.

Besides the six bails A to F, six similar bails designated G to L (Fig. 2) are pivoted on the rod **68** and have upstanding arms **67***a* connected by horizontal links **70** to detent levers **71**. The detent levers **71** are pivotally mounted on a rod **72** supported by the side plates **11** and are shaped like bell cranks with the horizontal arm provided with a notch **71***a* having the same function with respect to a lever **60** as the notch **63***a* in the detent lever **63**. When the levers **71** are rocked clockwise (Fig. 2), the upper end of a lever **60** will become seated in the notch **71***a* of the selected lever **71** and hold such lever **60** in the same way as the levers **63** hold the levers **39**.

For most of the character key levers, there is present both a lug **69***a* registering with one of the bails A to F and a lug **69***b* registering with one of the bails G to L, whereby both a lever **39** and a lever **60** will be selectively held in the manner described above to cause selective rotation of the type wheel **25R** and rocking movement of the bell crank **35** to selectively elevate or lower the type wheel **25R**. However, every character key has a lug **69***b* but not all character keys have lugs **69***a*. The reason for this is that there are seven characters in the annular rows of characters on the type wheels whereas there are only six rows of such characters on each type wheel. Normally, irrespective of vertical movement of the type wheel **25R**, there is always a character in each row in central position opposite the platen and to select the six characters in the central position, it is merely necessary to raise or lower the type wheel **25R** or **25L**.

The lugs **69***a*, **69***b* are located on the keys **69** according to the following table, the first column denoting the characters on type wheels **25L**, **25R**, respectively, with type wheel **25R** normally operative, while the second column denotes the bails A to L which are actuated to control the movement of the operative type wheel.

Character	Bails	Character	Bails
@, 2	G	), 0	E, G
#, 3	A, K	—, -	A, H
$, 4	A, G	¼, ½	F, G
%, 5	B, I	:, ;	J
¢, 6	C, K	', "	E, L
&, 7	C, G	., .	E, H
¾, 8	D, I	?, /	H
(, 9	E, K	", '	F, H

Character	Bails	Character	Bails
A, a	F, I	N, n	C, H
B, b	C, L	O, o	E, J
C, c	F, J	P, p	L
D, d	A, I	Q, q	F, K
E, e	A, J	R, r	B, L
F, f	B, K	S, s	K
G, g	B, G	T, t	B, H
H, h	C, I	U, u	D, L
I, i	D, H	V, v	B, J
J, j	D, K	W, w	I
K, k	D, G	X, x	A, L
L, l	E, I	Y, y	C, J
M, m	D, J	Z, z	F, L

The cam unit **47** is rendered operative by movement of the selected detent lever **71**, and for this purpose the horizontal arms of levers **71** extend to the right (Fig. 2) and overlie a universal bar in the form of a cross bar **51***a* secured to an arm **51***b* fixed to shaft **52**. Whenver one of the levers **71** is rocked clockwise to select a lever **60**, the horizontal arm of the lever **71** will engage the cross bar **51***a* and rock the arm **51** counterclockwise to release the cam unit for operation as explained above. This is another reason for providing each of the key levers **69** with a lug **69***b*.

Since depression of two character keys simultaneously would result in jamming of the machine due to simultaneously selecting two of the levers **39** or two of the levers **60**, key locking means is provided to prevent operation of two keys. This means is well known in the art and consists, in the case of the levers **71**, of a bar **73** (Fig. 2) which is slotted transversely to guide the horizontal arms of levers **71** and is also bored longitudinally to receive locking balls **74** which are of such size and arrangement that only one of the levers **71** may be actuated at a time. Lock-out mechanisms of this type are quite commonly provided in key controlled printing machines and many forms exist which could be used in place of the one shown in the drawings. A similar lock-out mechanism is provided for the levers **63** and consists of short blocks **64***b* (Figs. 1 and 2) secured to the brackets **64** and slotted and bored like bar **73** to accommodate lock-out balls **74***a*. The levers **63** are formed with curved lugs **63***c* which extend into the slots in the blocks **64***b* and cooperate with the balls **74***a*. Thus, only one of the levers **39** and only one of the levers **60** may be operated at a time.

The third movement of the type wheel consists in rocking the frame member **27R** or **27L** in a clockwise direction (Fig. 2) to cause the selected type character to effect an impression on a work sheet **75** wrapped around platen **76**

through the usual inking ribbon (not shown). For this purpose, there is provided a cross rod 77 which is carried by the links 42 and extends behind one arm of a bell crank 78 pivoted at the middle of rod 72. A spring 79 urges the bell crank 78 in a clockwise direction (Fig. 2) and normally holds the vertical arm of said bell crank in contact with the rod 77. When the links 42 are moved forwardly, that is, are pushed to the left (Fig. 2) by the cam unit 47, the bell crank 78 is rocked counterclockwise and the horizontal arm thereof, by engagement with a lug 27a formed in the frame 27R or 27L, as the case may be, rocks such frame clockwise to effect the impression by the selected type wheel, 25R or 25L.

Means are also provided to hold the type wheel rigid against both axial and rotational movements while characters are being printed. This means consists of an arm 80 (Fig. 2) pivoted on rod 72 adjacent the bell crank 78 and connected by a link 81 to one arm of a bell crank 82 secured to a shaft 83 journaled in the frame plates 11. A torsion spring 84 on the rod 83 normally urges the bell crank 82 in a counterclockwise direction (Fig. 2) against a stop rod 85 carried by the plates 11. Pivoted at 82a on the upper end of the vertical arm of bell crank 82 is an aligning member in the form of an arm 86 which is urged in a clockwise direction by a spring 87 which is hooked around a pin carried by the bell crank 82 and also around the arm 86, the spring being coiled around the pivot 82a for arm 86. A portion of the member 86 abuts a lug 82b formed in the bell crank 82 to limit clockwise rotation of the member 86 under the influence of spring 87. When the frame 27R or 27L, as the case may be, is operated by the bell crank 78 to print a character as described above, the lug 27a engages the arm 80 and rocks it counterclockwise, thereby depressing link 81 to rock bell crank 82 and the aligning member 86 clockwise as a unit.

Adjacent the bearing 33, each shaft 26R, 26L has a toothed aligning disk 88 formed with seven teeth 88a which are triangular in shape transversely of the disk 88 with the interdental spaces 88b V-shaped in side view. The aligning member 86 has six cut-away portions, as at 86a (Fig. 3), to form wedge shaped teeth capable of entering the V-shaped interdental spaces 88b (Fig. 4) in the aligning disk 88 to prevent rotational movement thereof. The shape of the cut-away portions 86a is such that the converging side walls of the spaces 86a engage the sides of the teeth in the disk 88 to prevent vertical movement of the operative shaft 26R or 26L. The cut-away portions 86a are spaced to correspond with the spacing of the rows of type characters on the type wheels, while the interdental spaces 88b on the disk 88 correspond in position to the type characters on the type wheels 25R or 25L. The positions of the tooth spaces on the disk 88 and the cut-away portions 86a on arm 86 are such that the type faces always strike squarely at the printing point.

For the purpose of selecting the type wheels 25R, 25L, there are provided two shift keys SK (Figs. 1 and 2) which form part of a bail 89 pivoted on the rod 68 and having a downward extension 90 (Fig. 2) connected by a link 91 to an arm 92 secured to the vertical shaft 29 which, it will be remembered, carries the arms 28 and 30. When a shift key SK is depressed, the bail 89 and arm 90 are rocked counterclockwise (Fig. 2), thrusting the link 91 to the rear or to the right, thereby rotating the shaft 29 clockwise (Fig. 1). This causes both the arms 28 and 30 to move in the same direction, thereby swinging the type wheel 25L into operative position. The lug 31a on the arm 31R is thereby carried out of cooperation with the end of the horizontal arm in bell crank 35 and into the channel shaped space in the bracket 34R. At the same time the lug 31a for the arm 31L is moved into the bifurcation in the bell crank 35.

Means is provided for preventing the type wheels 25R, 25L from being displaced with respect to the selecting mechanism. This means comprises a rack plate 94 (Fig. 1) which is attached to the cross member 16 above sector 40 by means of suitable screws 95 and spacing collars interposed between the cross member 16 and plate to prevent plate 94 from binding the sector 40. The rear edge of plate 94 is provided with teeth like the teeth on the pinions 41 on shafts 26R, 26L except for omission of teeth and formation of a small space directly in the center of the plate which permits free rotation of the pinion for the shaft 26R or 26L which is in the operative position.

As shown most clearly in Fig. 1, the teeth on the sector 40 and the teeth on the plate 94 are so arranged that the pinions are always in mesh with one or the other of these members. When the arms 28, 30 and shaft 29 are rotated in a clockwise direction with reference to Fig. 1, the shafts 26R, 26L are caused to rotate in consequence of the pinions rolling over the plate 94 and the sector 40. In other words, whenever the type wheel 25L is selected by a case shift operation involving the depression of a shift key SK, the lower case type wheel 25R will be rotated away from its normal position as well as shifted bodily to the right in Fig. 1 and upon a release of the shift key will be reversely rotated and shifted the same extent back to its normal position.

Provision is made of means for locking the gear sector 40 against movement while the key SK is shifting the type wheel 25L into position and vice versa. This means includes an aligning member 96 (Fig. 2) secured to the underside of the gear sector 40. The member 96 consists of an arm which is bent downwardly and horizontally toward the keyboard and its front or left hand edge (Fig. 2) is provided with a notch opposite the upper end of a detent lever 97 pivoted on a bracket 97a carried by the cross member 15. The lower end of the detent lever 97 is provided with a cam projection 97b coacting with a pin 90a carried by an arm 90b, forming part of the bail including the shift keys SK. The cam projection 97b is so designed that the initial movement of the shift key causes the detent lever 97 to rock clockwise (Fig. 2) whereby its upper end enters the notch in the detent member 96 before any appreciable movement of the type wheels into and out of operative position takes place with the result that the plate 94 and the gear sector 40 constitute the equivalent of a single fixed rack over which the pinions 41 may roll into and out of operative position.

Means is provided to effect spacing of the carriage 20 automatically each time a character is printed. Loose on shaft 44 is an arm 98 which is located alongside of a second arm 99 which is fixed to the shaft 44. The arm 99 has a bent-over lug 99a in the plane of the arm 98 whereby arm 98 will be rocked counterclockwise with each operation of the shaft 44 by the cam unit 47.

The arm 98 is connected by a link 100 to an arm 101a secured to a shaft 102 journaled in plates 11, and a second arm 101b on shaft 102 is connected by a link 103 to the escapement operating arm 104. As a result of this linkage, the arm 104 is rocked counterclockwise whenever a printing operation takes place and actuates the escapement 23 in a well known way, causing the carriage to space under the motive power provided by the usual spring motor (not shown).

For the purpose of spacing the carriage without printing, as between words, there is provided a space bar SB which is part of a double bail 105 pivoted on the rod 68a and having a crossbar 105a connected by a link 106 to a rock lever 107. The latter is journaled on a cross rod 108 and is connected by a link 109 to a cam unit control lever 110 similar in shape to the control lever 51. The control lever 110 controls a cam unit 111 (Fig. 1) like the ones disclosed in Patent No. 1,777,055. Cam unit 111 is pivoted on cross rod 48 to the left of the cam unit 47 (Fig. 1) and is connected by a link 112 to one arm of a bell crank 113 loosely mounted on the shaft 44 adjacent the arm 98. The bell crank 113 is provided with a lug 113a extending into the plane of the arm 98, whereby the latter may be rocked counterclockwise by similar rotation of either the arm 99, through lug 99a, or an arm of the bell crank 113, through the lug 113a. When the space bar SB is depressed, cross bar 105 is moved counterclockwise, thrusting the link 106 to the right (Fig. 2), thereby rocking the lever 107 counterclockwise to draw downwardly the link 109. This rocks control lever 110 in a counterclockwise direction and releases the cam unit 111 for operation by the power roller 24 in the same way as the arm 51 renders the cam unit 47 operative. As a result, the link 112 will be thrust upwardly, rocking the bell crank lever 113 counterclockwise and, through the lug 113a, rocking the arm 98 in the same direction to effect an operation of the escapement mechanism 23. Cam unit 111 also has a spring like 50 which holds the cam unit in the same position as cam unit 47 in Fig. 2, with bar 46a acting as a limit stop.

While there has been shown and described and pointed out the fundamental novel features of the invention as applied to a single embodiment it will be understood that various omissions and substitutions and changes in the form and details of the device illustrated and in its operation may be made by those skilled in the art without departing from the spirit of the invention. It is the intention, therefore, to be limited only as indicated by the scope of the following claims.

What is claimed is:

1. A typewriting machine comprising a plurality of type wheels, each type wheel having a plurality of annular rows of type; means to mount both of said type wheels for selective axial movement and selective rotary movement to select a character to be printed, means to selectively rotate said type wheels and to move them axially, and means to move a selected one of said type wheels into cooperation with the selective rotation and moving means.

2. In a typewriting machine, a type wheel having at least one row of characters thereon, a series of keys corresponding to said characters; means to selectively rotate the type wheel under control of the keys including a rock member having an invariable excursion, a sector for rotating the type wheel, and actuating levers on said rock member, each having one end engaging said sector, said levers being fulcrumed at different points intermediate their ends whereby when the free end of any lever is held, its other end will actuate the sector a predetermined extent for each movement of the rock member; power means for actuating the rock member, means controlled by the keys for selectively holding the ends of the actuating levers, and means controlled by the keys for causing an operation of the power means.

3. In a typewriting machine, a type wheel having at least one row of characters, a member for rotating said type wheel, a rock frame; a series of actuating levers pivotally mounted on said rock frame and having one end of each pivotally connected to said member, said levers being pivoted on said frame different distances from the point of connection to said member whereby when the other ends of said levers are held and the frame rocked, said member will be rotated different distances; a series of keys, means controlled by said keys and engageable with the free ends of said levers for selectively holding the free ends of said levers against movement whereby to effect selective rotation of the type wheel, and means to rock said frame.

4. In a typewriting machine, a type wheel having at least one row of characters, a sector for rotating said type wheel, a rock frame, a series of actuating levers pivotally mounted on said rock frame and having one end of each pivotally connected to said sector, said levers being pivoted on said frame different distances from the point of connection to said sector whereby when the other ends of said levers are held and the frame rocked, said sector will be rotated different distances, a series of keys, means controlled by said keys and engageable with the free ends of said levers for selectively holding the free ends of said levers against movement to effect selective rotation of the type wheel, and power means controlled by said keys for actuating said rock frame.

5. In a typewriting machine, a type wheel having at least one row of characters, a sector for rotating said type wheel, a rock frame, a series of actuating levers pivotally mounted on said rock frame and having one end of each pivotally connected to said sector, said levers being pivoted on said frame different distances from the point of connection to said sector whereby, when the other ends of said levers are held and the frame rocked, said sector will be rotated different distances, a series of keys, means controlled by said keys and engageable with the free ends of said levers for selectively holding the free ends of said levers against movement to effect selective rotation of the type wheel; and means to rock said frame, including a continually rotating power roller and a cam unit having means releasable for engaging said cam unit with said power roller and connected to said frame and released for engagement with the power roller by operation of any one of said keys.

6. In a typewriting machine, a type wheel having a plurality of annular rows of characters, means to mount said type wheel for axial movement to select a row of characters thereon, means for moving said type wheel axially including a rockable member coupled to the type wheel, a rock frame, series of actuating levers pivotally mounted on said frame and having one end of each pivotally connected to the rockable member and the other ends free, said actuating levers being pivoted intermediate their ends different distances from their free ends whereby when any one of them is held at its free end and the frame

rocked, the rockable member will be actuated an extent commensurate with the distance the selected lever is pivoted from its free end, a series of detent levers, each associated with one of said actuating levers and selectively engageable with the free end of said one lever, a series of keys operatively connected to said detent levers, and means controlled by said keys for rocking said frame.

7. In a typewriting machine, a plurality of type wheels, each having a plurality of annular rows of type characters, each of said type wheels being mounted for axial movement to select a row of characters, means to selectively move said type wheels axially including a rockable member, a rock frame having an invariable excursion, a series of actuating levers pivoted on said rock frame and having one end of each lever pivotally connected to the rockable member and their other ends free, said actuating levers being pivoted on said frame different distances from the point of pivotal connection to the rockable member, detents engageable with the free ends of said levers, said levers when held by said detent levers causing the rockable member to be rocked different distances according to the distance of the pivot of the selected lever from the point of its connection to the rockable member, keys for controlling the detent levers, and means to couple one or the other of said type wheels to said rockable member.

8. In a typewriting machine, a type wheel having a plurality of annular rows of type; means to rotatably and slidably mount said type wheel and means for selectively rotating and selectively displacing said type wheel along its axis including rock frames having invariable excursions, rockable elements, each associated with one of said frames and having connections to the type wheel for respectively rotating such type wheel and shifting it axially, actuating levers pivoted on said frames, said levers having their ends pivotally connected to said rockable members in groups and their other ends free, said actuating levers being pivoted intermediate their ends to said frame different distances from their points of connection to the rockable members whereby, when the free end of any lever is held against movement and the associated rock frame moved an invariable extent, the type wheel will be rotated or shifted axially an extent different from the extent resulting from holding another lever, and detent levers, each for holding the free end of one of said actuating levers; a series of keys for controlling said detent levers and means controlled by the keys for rocking said frames.

9. In a typewriting machine, a type wheel having a plurality of annular rows of type; means to rotatably and slidably mount said type wheel and means for selectively rotating and selectively displacing said type wheel along its axis including rock frames having invariable excursions, rockable elements, each associated with one of said frames and having connections to the type wheel for respectively rotating such type wheel and shifting it axially, actuating levers pivoted on said frames, said levers having their ends pivotally connected to said rockable members in groups and their other ends free, said actuating levers being pivoted intermediate their ends to said frame different distances from their points of connection to the rockable members whereby, when the free end of any lever is held against movement and the associated rock frame moved an invariable extent, the type wheel will be rotated or shifted axially an extent different from the extent resulting from holding another lever, and detent levers, each for holding the free end of one of the actuating levers; a series of keys for controlling said detent levers, and means controlled by said keys for operating said detent levers in combinations to effect a simultaneous rotation and axial displacement of the type wheel to select a character.

10. In a machine of the class described, the combination of a printing member having a plurality of type thereon, means to movably mount said printing member to select any of said type, a series of keys corresponding to said type, a member having an invariable movement; a series of actuating levers pivoted at different points intermediate their ends to said invariably movable member, one end of each lever having connection to the printing member, said levers, when held at their free ends and the invariably movable member is operated, causing the printing member to move a different distance for each lever so held; means controlled by the keys for holding the free ends of said levers, and means controlled by said keys for causing an operation of the invariably movable member.

11. In a machine of the class described, the combination of a printing member having a plurality of characters; means for selectively moving said member to select a character comprising a member having a to-and-fro movement and a series of operating members connected to and movable by the last named member and having at one end a connection to the printing member; a series of detents for the operating members, each detent when operated engaging one of the operating members, said operating members, when held by their detents and moved by the first member, each imparting a different extent of movement to the type wheel to select a character; selectively operable means for actuating the detents, and means controlled by the selectively operable means for causing an operation of the first named member.

12. In a machine of the class described, a printing member having a series of type, means for mounting said member for movement to select a type, an oscillatable member, a series of actuating levers pivotally connected to said oscillatable member; means connecting the ends of said levers to the printing member, the pivotal connections of said levers being arranged so that when the free end of any one of them is held and the oscillatable member is oscillated, the printing member will be moved a different extent for each lever; means cooperating with the free ends of said levers for selectively holding the free ends of said levers against movement, and selectively operable means for actuating the holding means.

13. In a machine of the class described, the combination of a printing memebr having a plurality of type, means to movably mount the printing member to enable one of said type to be selected, a series of actuating levers having one end thereof connected to the printing member; a series of detents for the other ends of said levers, said detents being selectively operable to hold the ends of said levers one at a time; and a common operating member for said levers having connections thereto at different points intermediate the ends of said levers whereby the printing member will be moved different extents according to which of said levers is held when the levers are moved by the common operating member.

14. In a machine of the class described, the combination of a series of actuating levers, an invariably movable element, a variably movable element, said elements being pivotally connected by said levers with different leverage ratios whereby variable movement is imparted through said levers to the variably movable element by the invariably movable element; detent means cooperating with each of said levers and when operated causing the associated actuating lever to have a pivotal movement under the influence of the invariably movable element to produce a variable movement of the variably movable element according to the lever detained, and power means for actuating the invariably movable element.

15. In a machine of the class described, the combination of a type wheel, a variably movable element for rotating said type wheel, an invariably movable element; a series of operating levers, each connected to the variably movable element and to the invariably movable element with variable lever ratios, respectively; a series of detents, each operatively engageable with one of said levers and when engaged with its associated lever and the invariably movable element is operated resulting in the type wheel moving an extent different from the movement effected by other detents; operating means for the invariably movable element, and selectively operable means for actuating the detents.

16. In a machine of the class described, the combination of a printing member having a plurality of rows of type, means to mount said printing member for two different movements at right angles to each other, a series of keys corresponding to said types; and means for selectively moving said printing member in both of said directions under control of said keys, said moving means including a variably movable element having a connection to the printing member, an invariably movable element, a plurality of actuating levers pivotally connecting said elements with different ratios, and a series of detents, each operatively engageable with one of said levers, each of said levers, when engaged by its detent, causing the variably movable element to be moved by the invariably movable element an extent to select a particular type.

17. In a machine of the class described, the combination of a series of actuating levers; a series of detents, each cooperating with one of said levers and when operated forming a fixed fulcrum for said lever; an invariably operable member connected to said levers with variable driving ratios and, when operated imparting different extents of motion to said levers; a variably operable member connected to said levers, and a printing member connected to the variably operable member and moved different extents to select type thereon by the movement of said variably operable member.

18. In a machine of the class described, the combination of a printing member having a plurality of type characters, an invariably movable element, a variably movable element having a connection to the printing member to effect movement thereof to select a type character, a series of detents; and a series of actuating levers, each lever corresponding to a detent and when the detent is operated having a pivotal relation thereto, said levers also having pivotal relationships with both of said elements whereby when any detent is operated to engage its associated lever and the invariably operated element is moved, the selected lever will impart motion to the variably operable element and effect a displacement of the printing member, said levers having their pivotal relations and relationships to the detents and the variably and invariably movable members so arranged that each lever effects a different extent of movement of the printing member.

19. In a machine of the class described, the combination of a continually rotating power roller, a cam unit engageable with the power roller and operable thereby, an invariably movable member connected to said cam unit, a printing member movable to different positions to select one of a plurality of type thereon, a variably movable member connected to the printing member, a series of actuating levers, each having pivotal connections to both the variably and invariably movable members with variable lever ratios; and a series of detents, one for each lever and arranged when operated to act as a third pivot point for said levers, said invariably movable member, when operated by said cam unit, moving all of said levers idly unless one of said detents is operated and, when any detent is operated, in consequence of said variable lever ratios, causing the variably movable lever associated therewith to move the variably movable member an extent different for each lever.

20. In a machine of the class described, the combination of a printing member having a plurality of rows of type and movable in one direction to select a row of type and in another direction to select a particular type in a row, a series of keys corresponding to the type on the printing member; separate means for effecting each of the two movements of the printing member, each means comprising an invariably movable member, a variably movable member, a series of levers, each having a variable ratio pivotal connection to the variably movable member and the invariably movable member respectively, and a series of detents corresponding to said levers and when operated engaging said levers to form pivots therefor; power means to operate the invariably movable members; means controlled by the keys for operating a detent for each of said separate means, said keys causing one or more of the detents to be operated to effect the one or both movements of the type wheel to select a type corresponding to the key operated; and means controlled by said keys for causing an operation of the power means.

21. In a machine of the class described, the combination of a type wheel having a plurality of annular rows of type, means for mounting said type wheel for both rotational and axial movement to select a type; a series of keys, each corresponding to a type; two series of actuating levers, one for effecting rotary movement and the other for effecting axial movement of the type wheel, respectively; invariably movable means pivotally connected to said levers for imparting a rocking motion thereto; two series of detent levers, each detent lever being associated with an actuating lever and engageable therewith to act as a pivot therefor; variably movable members, one for each of the two selecting movements of the type wheel, and having connections thereto for moving the type wheel axially and rotatably, each of said variably movable members being associated with a group of said actuating levers, said levers having different operating ratios to effect different extents of movement of the variably movable members and type wheel; and means whereby the keys operate the detent levers singly or in combinations to cause at least

one of said movements to select a type to take place with each depression of a key.

22. In a machine of the class described, the combination of a type wheel having a plurality of annular rows of type, means for mounting said type wheel for both rotational and axial movement to select a type; a series of keys, each corresponding to a type; two series of actuating levers, one for effecting rotary movement and the other for effecting axial movement of the type wheel; invariably movable means pivotally connected to said levers for imparting a rocking motion thereto; two series of detent levers, each detent lever being associated with an actuating lever and engageable therewith to act as a pivot therefor; variably movable members, one for each of the two selecting movements of the type wheel and having connections thereto for moving the type wheel axially and rotatably, each of said variably movable members being associated with a group of said actuating levers, said levers having different operating ratios to effect different extents of movement of the variably movable members and type wheel; means whereby the keys operate the detent levers singly or in combinations to cause at least one of said movements to select a type to take place with each depression of a key; power means for operating the invariably movable means, and means controlled by said keys for causing an operation of the power means each time a key is depressed.

23. In a machine of the class described, the combination of a type wheel having a plurality of characters thereon, a series of keys corresponding to the characters on the type wheel, a main operating member, an element connected to the type wheel to effect movement thereof to select a character; a series of actuating levers having different ratios, each lever being connected to the main operating member and to said element; and a series of detents, each cooperating with an actuating lever and selectively operable by the keys to render said levers effective.

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