

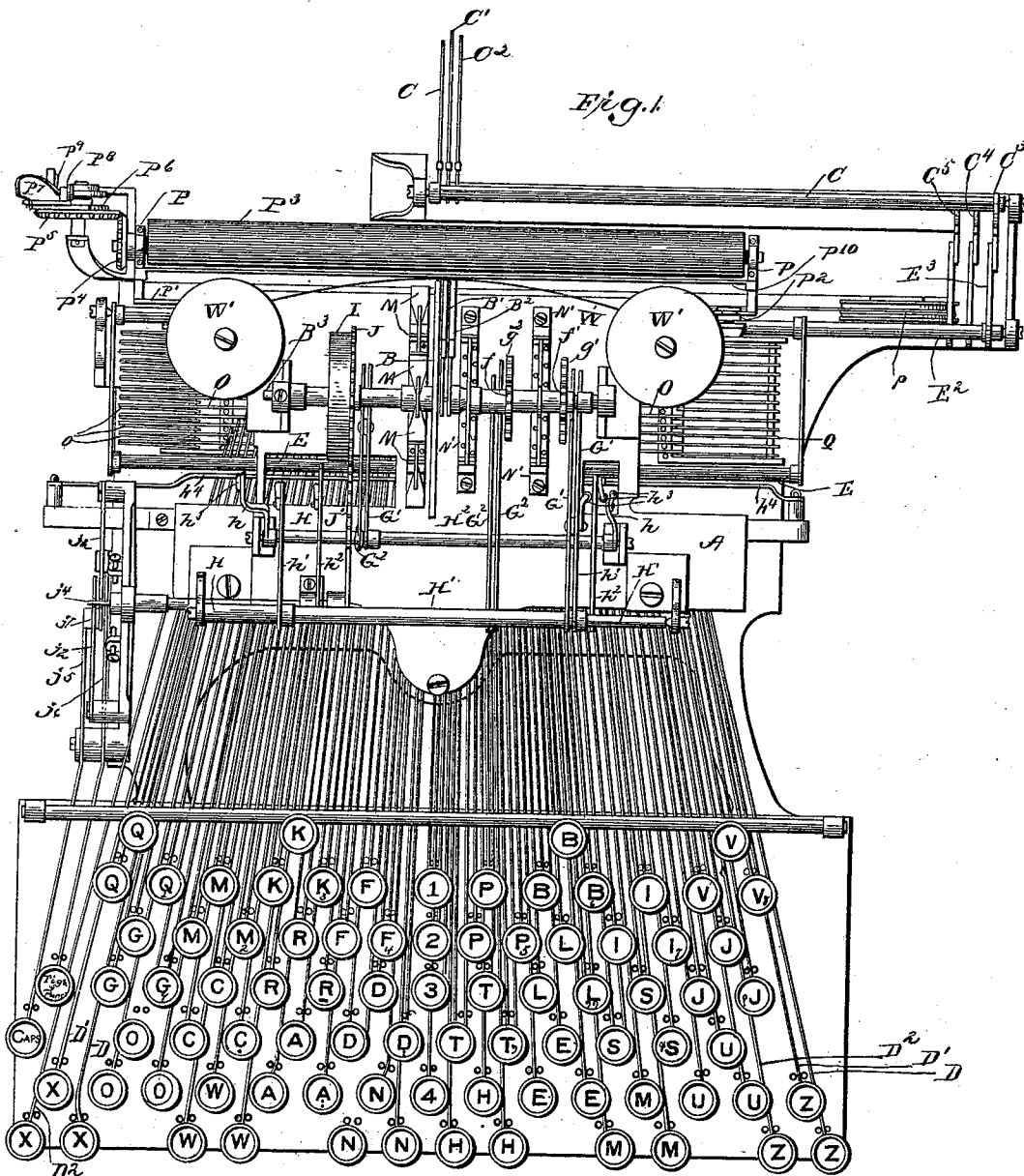
(No Model.)

7 Sheets—Sheet 1.

G. M. ECKELS.
TYPE WRITING MACHINE.

No. 544,571

Patented Aug. 13, 1895.



Witnesses:

J. M. Fowler Jr.
Aly Stewart.

Inventor:

G. M. Eckels
By Christ & Christ
His Attorneys.

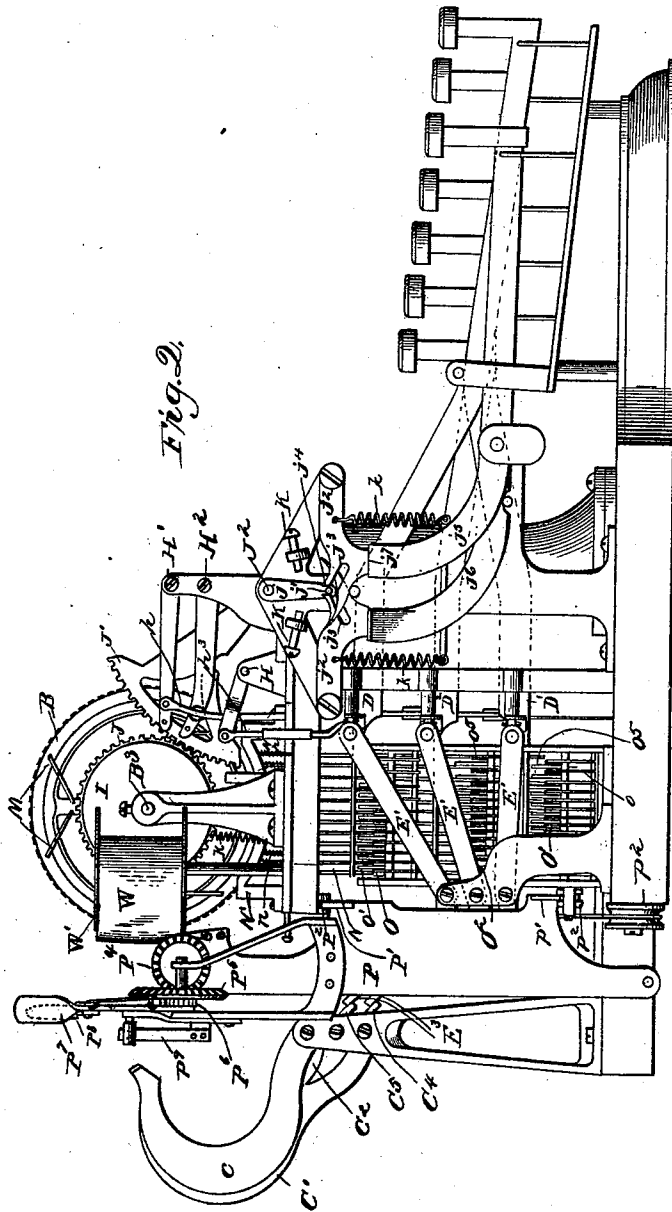
(No Model.)

7 Sheets—Sheet 2.

G. M. ECKELS.
TYPE WRITING MACHINE.

No. 544,571.

Patented Aug. 13, 1895.



witnesses:
J. M. Fowler
Aly Stewart

Inventor
Geo. M. Eckels,
By Chas. H. Hensley
His attorneys.

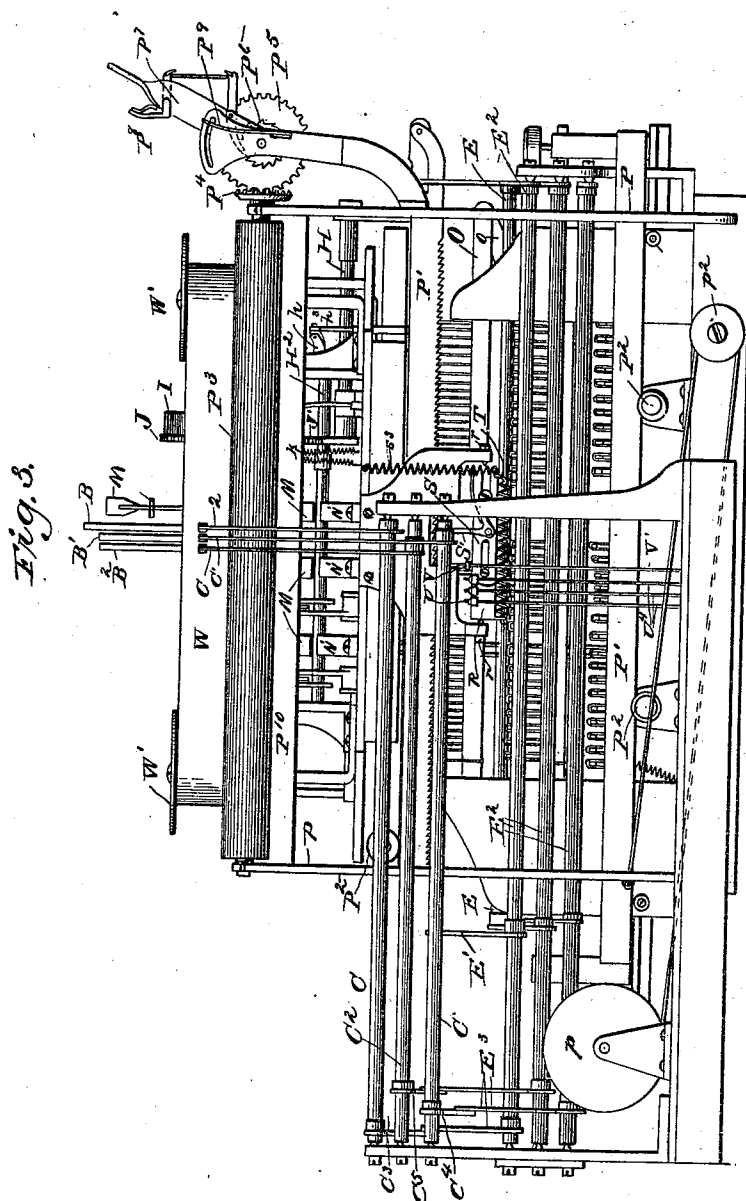
(No Model.)

7 Sheets—Sheet 3.

G. M. ECKELS.
TYPE WRITING MACHINE.

No. 544,571.

Patented Aug. 13, 1895.



Witnesses:
J.M. Fowler Jr.
Aly. Stewart.

Inventor:
Geo. M. Eckels,
By Church & Church
His Attorneys.

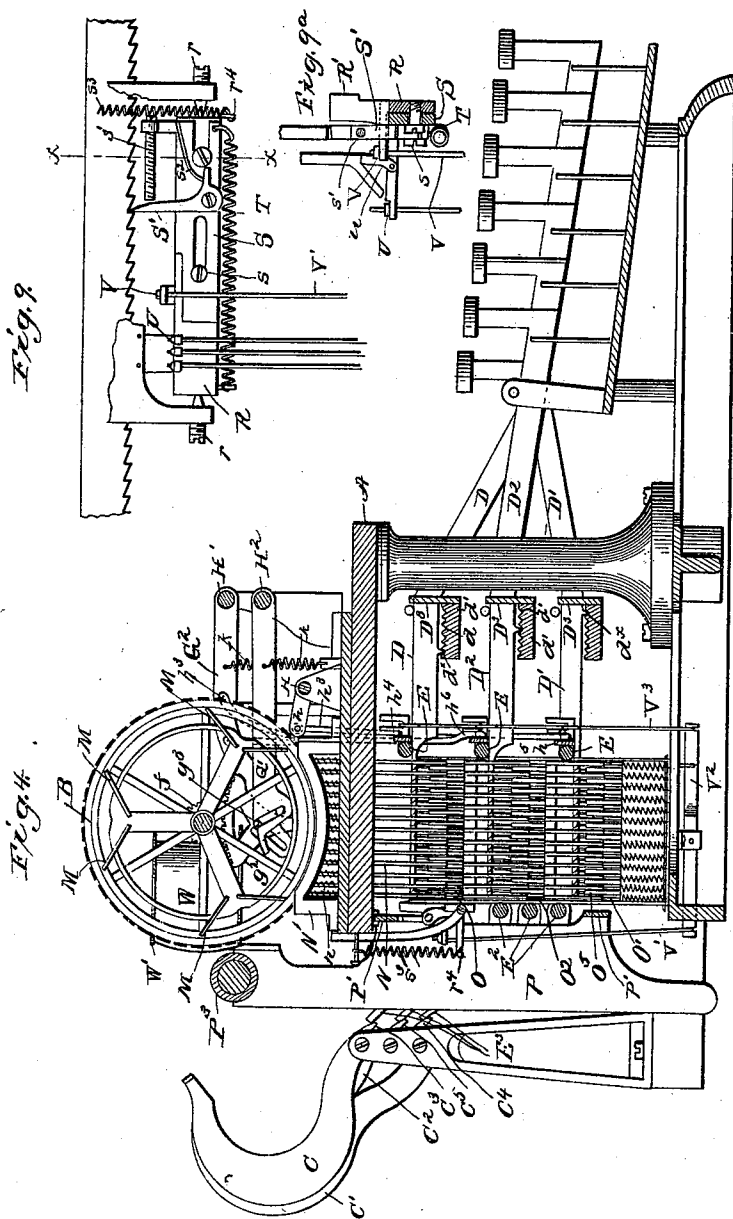
(No Model.)

7 Sheets—Sheet 4.

G. M. ECKELS.
TYPE WRITING MACHINE.

No. 544,571.

Patented Aug. 13, 1895.



Witnesses:

J. M. Fowler
Aly. Stuart

Inventor:
Geo. M. Eckels

By Chas. H. Smith

His Attorneys.

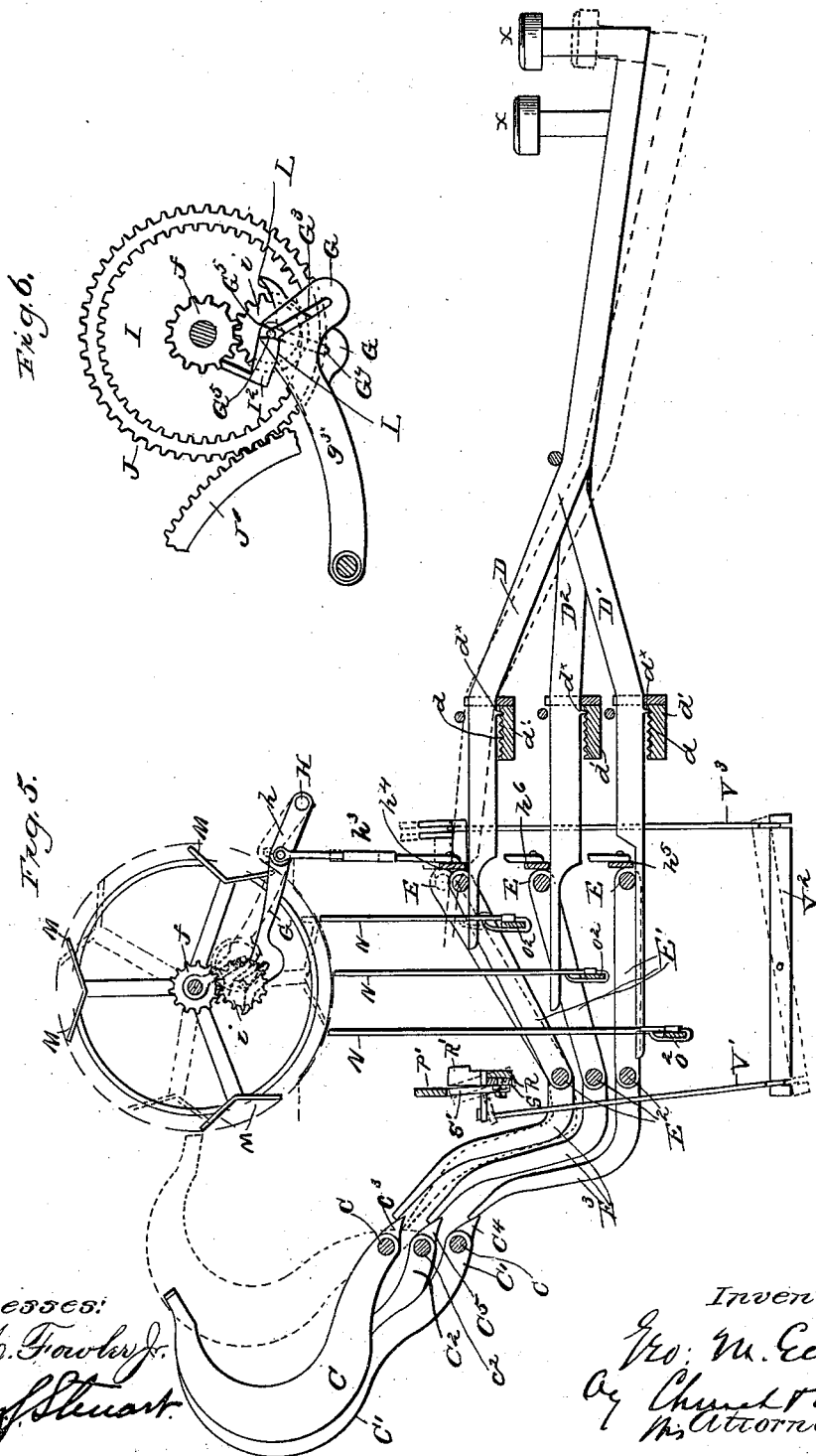
(No Model.)

7 Sheets—Sheet 5.

G. M. ECKELS.
TYPE WRITING MACHINE.

No. 544,571.

Patented Aug. 13, 1895.



Witnesses:
J. M. Fowler,
Alex. Stuart.

Inventor:
Geo. M. Eckels,
By Chas. L. Smith
Attorneys.

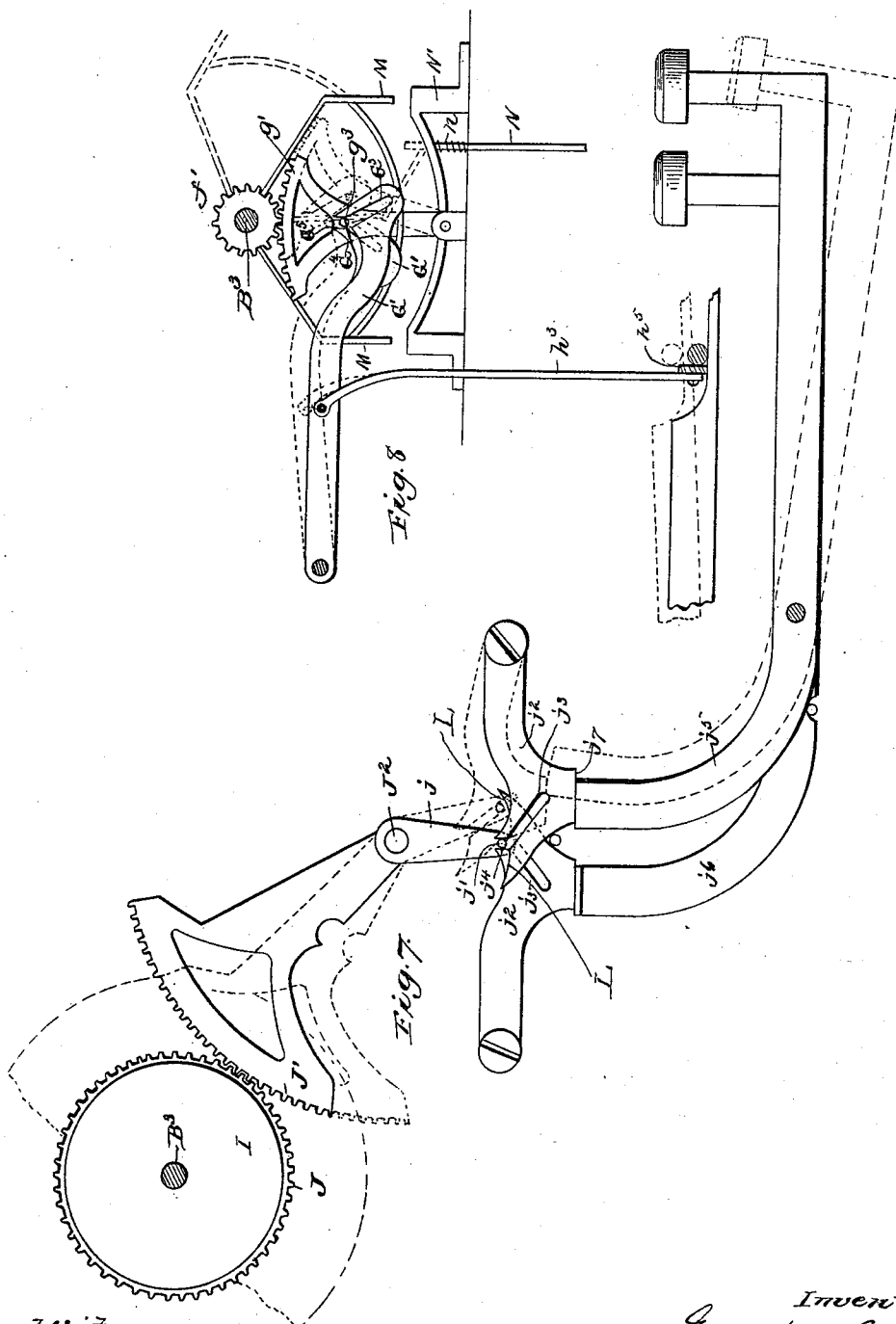
(No Model.)

7 Sheets—Sheet 6.

G. M. ECKELS.
TYPE WRITING MACHINE.

No. 544,571.

Patented Aug. 13, 1895.



Witnesses:
J. M. Fowler Jr.
Aly Stewart

Inventor:
Geo. M. Eckels
By Chas. H. Hines
His Attorneys.

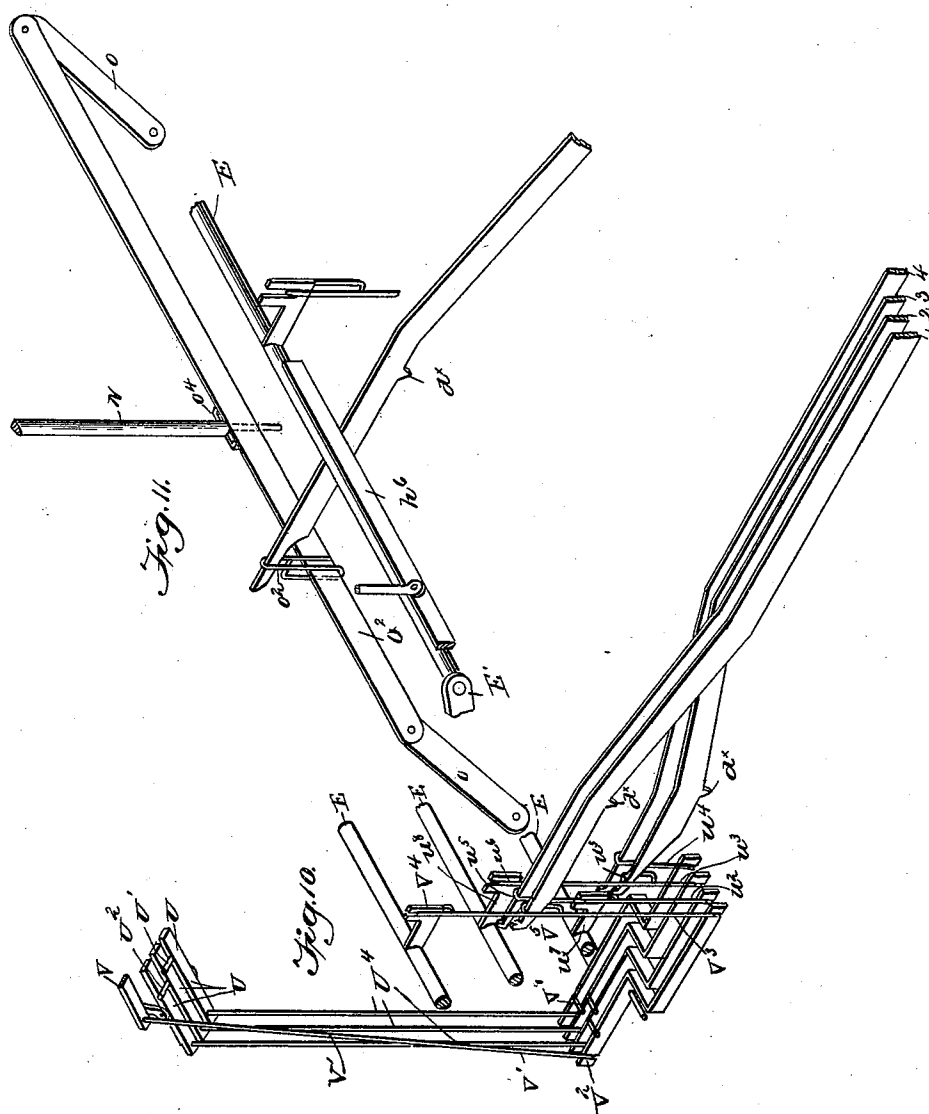
(No Model.)

7 Sheets—Sheet 7.

G. M. ECKELS.
TYPE WRITING MACHINE.

No. 544,571.

Patented Aug. 13, 1895.



Witnesses:
J. M. Fowler Jr.
Alex. Stewart.

Inventor:
Geo. M. Eckels.
By Chas. H. Church
His Attorneys.

UNITED STATES PATENT OFFICE.

GEORGE M. ECKELS, OF CHICAGO, ILLINOIS.

TYPE-WRITING MACHINE.

SPECIFICATION forming part of Letters Patent No. 544,571, dated August 13, 1895.

Application filed July 2, 1894. Serial No. 516,351. (No model.)

To all whom it may concern:

Be it known that I, GEORGE M. ECKELS, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Type-Writers; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the letters and figures of reference marked thereon.

This invention relates to improvements in type-writers, particularly of that class wherein a series of letters may be struck simultaneously to form a word or syllable of a word by a single movement of the operator's hand, and it has for its object to provide an improved groupment of the keys, whereby a greater number of combinations of letters used in ordinary writing may be arranged in consecutive order in the rows across the keyboard, further objects being to secure greater accuracy in the printing, to simplify and cheapen the cost, and enabling the full number of characters to be employed without complication.

The invention consists in certain novel details of construction and combinations and arrangements of parts, all as will be now described, and pointed out particularly in the appended claims.

Referring to the accompanying drawings, Figure 1 is a top plan view of a type-writer embodying my invention. Fig. 2 is an elevation, looking at the left-hand side. Fig. 3 is a rear elevation. Fig. 4 is a section from front to rear with the first type-wheel in elevation. Fig. 5 is a detail of the operating mechanism connected with one key. Fig. 6 is a detail sectional elevation of the shifting-gear for the first wheel to bring upper and lower case characters and figures into position for being shifted by the key-levers to bring the individual characters to the printing-point. Fig. 7 is a view looking at the opposite side of the gearing, Fig. 6, and showing the connections with the shifting-keys. Fig. 8 is a detail sectional elevation of the shifting-cams for one of the type-segments. Fig. 9 is a detail rear elevation of the carriage-feed mechanism. Fig. 9^a is a section on the line *x x*, Fig. 9. Fig. 10 is a perspective of the stops and their

operating-levers for securing the variable feed in printing different numbers of characters simultaneously. Fig. 11 is a detail of one of the elevating-bars and connected parts.

Similar letters and numerals of reference in the several figures denote the same parts.

The present machine operates in accordance with the general lines disclosed in my prior patent, No. 466,490, dated January 5, 1893—that is to say, in the present machine, as in said former machine, a series of sets of type-controlling mechanisms are provided for simultaneous operation to print the characters necessary to form a word or syllable, with a feeding mechanism operating to give a feed movement to the paper-carriage corresponding to the number of characters printed, and when desired one additional space, as at the end of a word. The keys controlling the same characters in the different printing mechanisms are brought together in groups, preferably triangular groups, as in my said former patent. In the present instance, however, they are not arranged in the same order as formerly; but on the contrary, the key of the first order or key controlling the type mechanism for printing the character in first position, is located at the right-hand corner of the group, the key for printing second-order characters being located at the apex of the triangle, and the key for printing third-order characters being located at the left-hand corner. With such an aggroupment of keys controlling the same character, it will be observed that a number of combinations of three letters in frequent use may be struck by depressing simultaneously keys adjacent to each other, thus in a large measure avoiding the necessity of bridging keys in striking the proper characters and presenting the keys to the operator's eye in their natural order and in proximity to each other, insuring greater accuracy and simplicity in operating the machine. The printing mechanism in this machine consists of a series of type-wheels, or more properly, type-segments $B B' B^2$, carried by independent sleeves journaled on a shaft B^3 , mounted on the frame *A* in supports of any suitable character. Co-operating with these type-segments are a corresponding number of hammers $C C' C^2$, mounted on transverse shafts $c c' c^2$ in rear of the machine and

operated from the key-levers simultaneously with the setting of the type-segments.

The mechanism for accomplishing these two results is as follows: The key-levers D, D', and D² extend rearward from the keyboard through slotted guides D³, and are fulcrumed on downwardly-extending projections $\bar{d}^x$, fitting in one or the other of the series of transverse grooves $\bar{d}$ in the fulcrum-bars $\bar{d}'$. A series of grooves are provided in order that the levers which are of different lengths may be properly pivoted to exert the same power or yield to the same degree of finger-pressure. The levers for the keys for the printing mechanism of the first, second, and third orders are separated into banks, their rear ends being bent to overlie their respective fulcrum-bars, and across their rear ends are arranged transverse hammer-operating bars E, carried on arms E', projecting forwardly from shafts E², Fig. 2, passing away across the machine in front of the carriage, and having mounted thereon at the right-hand ends rearwardly-projecting arms E³, Fig. 3, which, as the bars E are elevated, are adapted to swing downward and rearward, and by striking the projections or arms c^3 c^4 c^5 on the shafts c c' c^2 turn said last-mentioned shafts, and cause the hammers C C' C², rigidly mounted thereon, to swing forward against the type at the printing-point, or more properly against the paper and ink-ribbon which are interposed between the hammers and type-segments, as will presently appear.

For the purpose of bringing the type on the segments to printing position by the depression of the keys, the type-segment sleeves are provided with gears or pinions f f' f^2 , respectively, and with the pinions f' f^2 mesh gear-segments g' g^2 , Fig. 8, preferably pivoted to the frame at a point below the pinions, and each bearing a pin g^3 , with which pins pairs of operating and locking cams G' G² engage.

The members of each pair of cams G' G² are provided with oppositely-inclined cam-slots G³ G⁴, terminating at the upper end in vertical and oppositely-arranged walls G⁵, one on each cam, and between which the pin on the segment controlled by that pair of cams normally rests, and whereby it is locked against movement in either direction, but when an upward movement of either cam takes place the pin is carried along in the cam-slot and the gear-segment and type-wheel or segment moved correspondingly.

By the employment of a pair of cam-levers for each segment it will be noted that the segments may occupy an intermediate position and be shifted in either direction, as desired, and hence its extent of travel for any impression greatly reduced. In order now that the cam-levers may be moved independently and conveniently they are mounted on sectional shafts or sleeves H H' H² H³, journaled transversely of the machine on the front of the frame, and from arms h h' h^2 h^3 on these sectional shafts connecting-rods h^3 extend

down to transversely-arranged operating-levers h^4 h^4 , h^5 h^5 , and h^6 h^6 , pivoted to the frame at the outer ends and overlying the rear ends of the key-levers. The operating-levers h^4 , h^5 , and h^6 extend over only one-half the key-levers in its particular bank. Thus the keys on one side of the keyboard will operate to move the segments in one direction and those on the other side will move them in the opposite direction, being connected to opposite cams of the pair.

To economize the number of type-segments and at the same time leave a sufficient space between letters thereon the characters of the first order are arranged on a wheel divided into three segments, and is adapted to be turned on its center to bring any set of characters into the operative field, the segment normally in position for printing carrying the ordinary small-letter alphabet, and the other segments of the wheel carrying the capital letters and the figures and punctuation-marks, respectively. It is because of the necessity for turning this wheel to bring any one of its segments to the normal printing position and causing it to be shifted back and forth from this position to bring the particular character corresponding to the key depressed to the printing-point that it has been found desirable to employ, in lieu of the gear-segments of the other type-segments, an internally-toothed wheel or member I, (as it may not be a complete wheel,) journaled on a center coincident with the type-wheel, and an idler gear-wheel i journaled on an arm I², which latter is in turn journaled on a center coincident with the center on which the type-wheel and pinion f turn. The idler gear-wheel i meshes with the internal teeth of the member I and with the pinion f . A pin lettered g^{3*} , corresponding to the pins g^3 , projects, preferably, from the center of the idler-wheel, and the pair of cam-levers G, corresponding exactly to the cam-levers G' and G² heretofore described, co-operate with this pin, locking the same in normal position; and when the internally-toothed member is held stationary a movement of either of the cam-levers will, through the gearing described, cause the type-wheel to turn. The top bank of key-levers controls the first-order characters, or, in other words, the type wheel or segment on the right-hand side, the middle bank the third-order characters, and the lower bank the second-order characters, and consequently the operating-levers h^4 h^4 , h^5 h^5 , and h^6 h^6 , for the respective cam-levers are located across the inner ends of the levers in the order mentioned. So far I have described simply the means for giving the first type-wheel a movement corresponding to the movement of the other type-segments; but it is obvious from the mechanism described that if the internally-toothed member be rotated and the pin g^{3*} held against lateral movement the gear f and type-wheel will be rotated through the medium of the

idler gear-wheel. Now, in order to shift this internally-toothed member, I make use of a double cam-and-pin arrangement similar to those for shifting the type-segments, and as a convenient, though not by any means an essential, mechanism for imparting the movement of the cams to the said internally-toothed member the latter is provided with external teeth J, with which a gear-segment J', mounted on a shaft J², is in mesh. The shaft J² extends out to the side of the machine and carries a crank-arm j provided with a pin j'. Cam-levers j², having cam-slots j³ therein, cooperate with the pin j' for throwing it in one direction or the other, and locking-faces j⁴ on said cams hold the pin and internally-toothed member against movement, except when one of the cams is raised. Upwardly-curved case-key levers j⁵ j⁶ underlie bearings j⁷ on the cam-levers, and serve, when one or the other of the keys are depressed, to elevate one of the cam-levers and shift the type-wheel one-third of the way around, but without, however, in any way disturbing the position of the pin j^{3*}, which may still be shifted by its operating-cams to move the type-wheel to bring any character in that segment to the printing-point. Adjustable stops, such as screws K, serve to limit the movement of the crank-arm j, and throughout the machine I prefer to return the cam-lever to normal position by spring-pressure, this being secured in the structure shown by springs k, secured at one end directly to the cam-levers and at the other to the frame or suitable projections carried thereby.

The operation of both of the cam-levers of a pair simultaneously is prevented in every instance by forming stop surfaces L on each lever, curved to correspond to the arc traversed by the pin when shifted by the other cam. Thus when the pin is moved over one of said stop-surfaces that cam is locked against any movement and there can be no false impression due to the simultaneous striking of two keys, tending to move the type-segment in opposite directions. Up to this point I have described a means for moving the type-segments from the key-levers, and while it might be possible to so accurately adjust the parts as to always move the said segments the proper distance, yet in the practical machine it is found expedient to provide the segments with stop projections, which, as shown, consist of wing-like extensions M, secured to the sleeves to rotate in unison with the segments and adapted to contact with stop-pins N pushed up through the pin frame or frames N' by the key-levers, as will be presently described. Two stops M are preferably employed on each segment and arranged to strike the same pin to stop the segment when turned in opposite directions. Thus one pin answers for two keys or characters. The keys, it will be understood, are arranged to operate different cams of the pair, and consequently move the segment in opposite direc-

tions, and a number of pins are therefore required corresponding to one-half the number of characters.

The pins N are guided vertically in the segmental pin-frames N', and have springs n surrounding them for holding them down in normal position and out of the path of the stops on the type-segments. At the lower ends the pins rest upon one of a series of sets of bars O O' O². All the pins for the first type-segment or wheel rest on the bars of the top set, the pins for the second segment on the bottom set O', and the pins for the last segment on the middle set, the bars themselves being mounted upon parallel links o at each end, so as to be movable vertically while maintaining their horizontal position. This enables me to make the connection between the vertically-movable bars and key-levers at any point in the length of the bars, and secure the same extent of pin movement. From the ends of the key-levers links or connecting-rods o² extend down and under the respective bars. As shown in Fig. 5 the lower ends of the connector are looped around the bars, allowing the bars a free upward movement when operated by another key, for, as before explained, each pin is elevated for either of two characters, or when either one of two keys is depressed, and hence two key-levers are connected with each bar, but preferably at opposite ends, so as to be in position to move different cam-operating levers. This arrangement will be readily understood from Fig. 11, wherein it will also be seen that each bar has a slot or elongated seat-bearing o⁴ formed therein, into which the reduced lower end of its stop-pin enters, whereby said pin is held against accidental disengagement, and that without creating any frictional resistance to the movement of the parts upon each other.

Guide-pins o⁵ are provided between the bars to hold them against lateral movement, as will be seen from Figs. 1 and 2; but it is obvious that the bars may be guided in any suitable manner.

It remains now to describe the paper-carriage and the feeding mechanism for giving a movement to the carriage corresponding to the number of characters formed by each impression, and, if desired, a space after each impression, or, in other words, to give the carriage a feed of one space if a single character is struck and two or three spaces if two or three characters are struck simultaneously, with a space after the same, when necessary.

The carriage has a simple rectangular frame P with longitudinal tracks P' working on and between grooved rollers P² on the back of the frame, and adapted to be moved by a spring wound in a drum p and connected with the carriage through a flexible connection p' passing from the drum around a pulley p³ and back to the frame of the carriage.

At the top of the carriage-frame a roller P³ is journaled and adapted to be rotated by a

bevel-pinion P^4 , secured thereon at one end and meshing with a larger pinion P^5 rotating in a plane transverse to the plane of movement of the carriage, and provided with a ratchet-hub P^6 , with which a spring-pressed pawl on an upwardly-projecting lever P^7 engages. The pawl has a releasing-lever P^8 in position to be grasped and pressed against the lever P^7 when it is desired to move the lever or carriage without rotating the roller. When the carriage is to be returned to first position a pressure against the lever P^7 will turn the roller to feed the paper lying between the roller and guide-piece P^{10} , and a continued pressure moves the carriage back to first position. A spring P^9 returns the lever to normal position when the pressure is relieved.

The horizontal rail P' at the center of the carriage is toothed or formed into a rack-bar on the under edge, with which a pawl mechanism operated by the key-levers co-operates. This pawl mechanism, Figs. 9 and 9^a, consists of a pawl-frame R mounted on centers r to swing transversely of the rack, and having an upwardly-projecting pawl R' rigid thereon, which by the swinging of the frame may be moved into and out of engagement with the rack-teeth.

On the front of the pawl-frame R there is mounted a supplemental sliding pawl-frame S , preferably held in place by screws s passing through slots in the supplemental frame, and a second pawl S' is pivoted on this supplemental frame so as to swing down to permit the rack to ride over it as the carriage is returned, but abutting against the adjustable stop s' when moved in the opposite direction. A flat spring s^2 serves to hold the pivoted pawl upright and the coiled spring s^3 , connected at one end to the frame and at the opposite end to a forwardly-projecting arm r^4 on the pawl-frame, serves to hold the said frame swung up with the pivoted pawl beneath the rack-bar, from which it will be seen that when the pawl-frame is tilted or swung back to bring the fixed pawl into engagement with the rack-bar the supplemental pawl-frame is free to move longitudinally under the influence of the coil-spring T , Fig. 9. Then when the pawl-frame resumes its normal position the pivoted pawl will enter a new space, and the pull on the carriage being sufficient to overcome the spring T the carriage will advance a distance corresponding to the distance the supplemental pawl-frame has moved in the opposite direction under the influence of its said spring T . The extent of this feed may be easily and accurately regulated by interposing movable stops to limit the movement of the supplemental pawl-frame. For instance, when a type of the first order is struck the carriage should advance but one space and the said supplemental pawl-frame should move back the distance between two teeth, but when letters of the second and third order are printed simultaneously with the letter of the first order the said frame

must have a correspondingly-greater movement. The preferred means for accomplishing this result consists in the employment of a series (usually three) of stop-levers U , Figs. 9 and 10, pivoted on extensions u of the frame and having their inner ends projecting into the path of the supplemental pawl-frame to limit its longitudinal movement. The third lever has a pin U' projecting beneath the second, and the latter has a pin U^2 projecting beneath the first, the result being that while the first lever can be raised by itself, the second when raised will raise the first, and the third will raise all and allow the supplemental pawl-frame a full movement corresponding to four spaces.

To secure the normal feed when a one-space key or a key-lever of the first order is depressed an arm V extends out from the pawl-frame and a rod V' , passing down therefrom, hooks under the end of one of a set of levers V^2 , Figs. 4, 5, and 10, pivoted at the bottom of the frame, said lever having at its inner end a connecting-rod V^3 extending up and hooked over an arm V^4 on the rod E overlying the inner ends of the first-order key-levers. At an intermediate point (see Fig. 10) a loop V^5 is provided on the connecting-rod V^4 , into which projects the end of a key-lever for giving one space without making an impression. This space-key, numbered 1, extends out into the keyboard, being provided with a suitable finger-piece, as shown, and it is obvious from Fig. 10 that when said key, numbered 1, is depressed and its inner end raised the arm V will be depressed through the connections $V' V^3 V^4$, swinging the pawl-frame back and permitting the supplemental pawl-frame to slide along until it strikes against the first stop-lever and the carriage to advance one step without operating any of the printing mechanism.

When an abnormal feed is desired, by which I mean a feed of two, three, or four spaces, one, two, or three of the stop-levers U are moved out of the way of the supplemental pawl-frame, as above mentioned, through the medium of connecting-rods U^4 , extending down and hooking under the ends of the second, third, and fourth levers V^2 , respectively, and from the inner ends of these levers other connecting-rods $u^2 u^3 u^4$ extend up and have loops u^5 thereon, through which the inner ends of the space-keys numbered 2, 3, and 4 project, and whereby the stop-levers may be operated, as described, by the depression of the proper key. The connecting-rods u^2 and u^3 , in addition to being connected with their respective space-key levers, are also connected by loops u^6 with arms $u^7 u^8$ on the bottom and middle bars $E E$, respectively, and hence, when keys of the second or third order are operated, the first or the first and second of the stop-levers U are moved out of the way of the supplemental pawl-frame, and the latter is thus permitted to move back two or three spaces, as the case may be, and allow the car-

riage to advance a corresponding distance when the key is released and the movable pawl allowed to engage the rack.

The space-key numbered 4 operates the last stop-lever, together with the first and second, through the pin connection heretofore described, and is utilized either to give the carriage a feed of four spaces, or assuming that three characters are simultaneously impressed to give an additional space after their impression by being depressed at the same time the character-keys are depressed. So, too, when it is desired to make a space after an impression of one or two characters, it may be done by depressing the No. 2 or 3 space-key, as the case may be, at the same time that the character-keys are depressed. In order to tilt the pawl-frame when keys of the second, third, or fourth order are depressed, I preferably form a connection between the levers V^2 , whereby the second will operate the first, the third will operate the second and first, and so on, consisting of pins or projections V^3 , extending from each lever out over the lever of the next lower order, (see Fig. 10,) and hence the operation of any lever will operate all the levers of a lower order and through the rod V' and arm V operate to tilt the pawl-frame into position for the supplemental pawl-frame to move back against the stop-levers or its permanent stop should all the stop-levers be out of the way. An ink-ribbon W passes between the type-segments and paper at the printing-point, being preferably wound on bobbins W' W' , and, if desired, any of the well-known guiding and feeding mechanisms may be employed to move the ribbon and present a fresh surface for each impression. In operation the paper is introduced between the roller and guide on the carriage and advanced after the printing of each line by the movement of the feed-lever as the carriage is returned to normal position.

The operator in fingering the keyboard, if printing single characters, touches only character-keys of the first order, just as in an ordinary type-writer; but when it is desired for the sake of speed or for other reason to print, say, three characters simultaneously, he places his fingers on the first-order key of the first character, the second-order key of the second character, the third-order key of the third character, and, if a space is desired, the fourth-space key and depresses them all at the same time. The fingering of the keys will become mechanical after a little practice, being materially facilitated by arranging the keys with those of the first order at the right, those of the second order at the apex of the triangle, and those of the third order at the left, as will appear upon a moment's reflection, for the operator has first, second, and third order keys, reading from left to right, in proximity before him. True, in many combinations of letters with the arrangement

shown, keys must be bridged; but in a still greater number of combinations the characters read from left to right, and either two or all three of the keys lie in proximity to each other in the same row, or one of them in the next higher or next lower row, where it may be conveniently struck.

By the employment of an independent hammer for each type-segment it will be observed that there is no danger of printing a character other than that on the particular segment desired, even though characters on the other segments should be at the printing-point, and, further, the keys controlling any set of characters which it is desired to print at one time need not be depressed at exactly the same instant, and still the printing will be done and a proper feed be made.

Having thus described my invention, what I claim as new is—

1. In a type writing machine, the combination with a series of independently controlled impression mechanisms and a feeding mechanism, of groups of keys controlling like characters in the different impression mechanisms arranged with the keys controlling the first impression mechanism at the right hand side of the group, the key for the last impression mechanism at the left hand side of the group, and the key for the intermediate impression mechanism, at an intermediate point but out of alignment with the other keys of the group; substantially as described.

2. In a type writing machine, the combination with independently controlled impression mechanisms, of the first, second and third order and a variable feed for advancing the carriage a distance corresponding to the order of the impression made, of a series of keys, controlling each impression mechanism, keys for the same character in all the mechanisms being arranged in substantially triangular groups, with those of the first order at the right hand corner, those of the second order at the apices and those of the third order at the left hand corner of the groups respectively; substantially as described.

3. In a type writer, the combination with the key levers and carriage, of a printing mechanism embodying a reciprocating type segment, a pin or projection controlling the movement of the segment, a pivoted cam lever having an inclined cam surface with a straight locking surface at the end, the incline cooperating with the pin to lock or shift the type segment and a connection between the cam lever and key levers; substantially as described.

4. In a type writer, the combination with the key levers and carriage, of a printing mechanism embodying a reciprocating type segment, a pin or projection controlling the movement of the segment, pivoted cam levers having oppositely inclined cam surfaces, and oppositely arranged straight locking surfaces cooperating with the pin to lock or shift the

type segment in opposite directions, and connections between said cam levers and key levers; substantially as described.

5 In a type writer, the combination with the key levers and carriage, of a printing mechanism embodying a reciprocating type segment, a pin or projection controlling the movement of the segment, pivoted spring pressed cam levers having oppositely inclined
10 cam slots terminating at the top in oppositely arranged straight locking surfaces, cooperating with the pin to lock or shift the type segment in opposite directions, and connections between the respective cam levers
15 and different key levers; substantially as described.

6. In a printing mechanism for type writers, the combination with a plurality of sets of key levers, a plurality of independently
20 movable type segments, a pin or projection controlling the movement of each of said segments, pairs of independent cams controlling each of said pins and connections between each of the pairs of cams and key levers of one
25 of the sets, whereby the operation of key levers of different sets will operate different cams and type segments; substantially as described.

7. In a type writer, the combination with
30 the key levers, the reciprocating type segment the oppositely arranged cams for shifting the segment in opposite directions and connections between said cams and different key levers for moving the segment in opposite directions,
35 of oppositely arranged stops moving in unison with the segment and a series of pins, adapted to be projected between said stops and connections between each of said pins and two key levers, substantially as described.

40 8. In a type writer, the combination with the key levers, the reciprocating type segment oppositely arranged cams for moving said segment in opposite directions, operating levers for said cams, extending over one half
45 of the key levers respectively, and oppositely arranged stops moving in unison with the type segment, of a series of pins adapted to project between said stops, an elevating bar for each of said pins and a connection between each of said bars and two of the key
50 levers; substantially as described.

9. In a type writer, the combination with the key levers, the type segment moved thereby, and the stop pins, of the bars for elevating the pins mounted on pivoted links, whereby they preserve their parallelism when moved, and connections between the bars and key levers; substantially as described.

10. In a type writer, the combination with
60 the key levers arranged in sets, the ends of each set being separated from the other sets, the series of type segments, one for each set of levers, and the series of sets of pins one set for each segment, of the series of sets of bars for elevating the pins, each of said bars being mounted on pivoted links, and connections between the bars of each set of bars

and the key levers of one of the sets of key levers; substantially as described.

11. In a type writer, the combination with
70 the key levers and type wheel composed of a plurality of segments with connections between said wheel and key levers for shifting the wheel to bring any character in a segment to the printing point, of a shifting gear for
75 turning the wheel to present a new segment consisting of the pinion connected with the type wheel, the internally toothed member, the idler gear interposed between the internally toothed member and pinion, a pin controlling the internally toothed member, the
80 oppositely arranged cams cooperating with the pin and the case keys for moving said cams; substantially as described.

12. In a printing mechanism for type writers, the combination with the type wheel composed of a plurality of segments and a pinion connected to move in unison therewith, of an idler wheel in mesh with the pinion on the type wheel mounted on an arm
90 pivoted on a center coincident with the center of the pinion, an internally toothed member in mesh with the idler, independent pins or projections controlling the idler and internally toothed member respectively and independent sets of oppositely arranged cams having oppositely arranged locking faces cooperating with said pins for locking or moving the wheel in different directions; substantially as described.

13. The combination with the reciprocating segment or member and pin controlling the same, of the cam levers having the oppositely inclined cam slots and locking surfaces on each lever curved to conform to the path
105 traversed by the pin when moved by the other cam, whereby but one cam can be moved at once; substantially as described.

14. In a printing mechanism for type writers, the combination with the reciprocating
110 type segment and pin controlling the same, of the cam levers having the oppositely inclined cam slots terminating in oppositely arranged vertical pin locking surfaces and each cam lever having a lever locking surface
115 curved to conform to the path of travel of the pin when moved by the opposite cam; substantially as described.

15. In a type writer, the combination with the key levers, type wheel and hammer, of
120 the pins for arresting the type wheel, the bars mounted on links pivoted at each end to swing vertically and having the intermediate slot bearings in which the ends of the pins work, and connections between the bars and key
125 levers; substantially as described.

16. In a type writer, the combination with a series of type segments, a corresponding series of independent hammers, cooperating respectively therewith, and a key board having an independent set of keys for each type wheel and hammer, a carriage and a feed mechanism therefor operated by each of the key levers; substantially as described.

17. In a type writer, the combination with a series of type segments and an independent set of key levers for each type segment, of an independent hammer for each segment, an operating bar for each hammer crossing one of the sets of key levers and a carriage and feed mechanism operated by all the key levers; substantially as described.

18. In a type writer, the combination with the carriage, a series of type segments and an independent set of key levers for each type segment, of an independent hammer for each segment, shafts on which said hammers are mounted journaled in rear of the carriage, a corresponding series of shafts journaled in front of the carriage, operating bars connected with said last mentioned shafts, each crossing one of the sets of key levers, connections between said shafts in front and rear of the carriage and a variable feed for the carriage operated by all the key levers; substantially as described.

19. In a type writer, the combination with the carriage, a series of type segments and an independent set of key levers for each type segment, of an independent hammer for each segment, shafts on which said hammers are mounted journaled in rear of the carriage and extending beyond the end of the path of travel

of the carriage, a corresponding set of shafts journaled in front of the carriage, arms connecting the ends of the shafts beyond the path of travel of the carriage, operating bars each crossing one of the sets of key levers and connected with one of the shafts in front of the carriage and a feed mechanism for the carriage operated by all the key levers; substantially as described.

20. In a type writer, the combination with the series of sets of key levers, a printing mechanism for each set and a carriage, of a feed mechanism for said carriage embodying a rack bar, a pawl and pawl frame movable transversely of said rack bar with connections between said pawl frame and all the key levers, a supplemental pawl mounted to slide in bearings on the pawl frame in a line substantially parallel with the rack bar, the rack bar, and a series of stops interposed in the path of the supplemental pawl for limiting the movement of the same, said stops being controlled by the sets of key levers respectively; substantially as described.

GEORGE M. ECKELS.

Witnesses:

MELVILLE CHURCH,
ALEX. S. STEUART.