No. 819,773. PATENTED MAY 8, 1906.

E. G. LATTA.

TYPE WRITING MACHINE.

APPLICATION FILED JAN. 17, 1905.

3 SHEETS—SHEET 1.

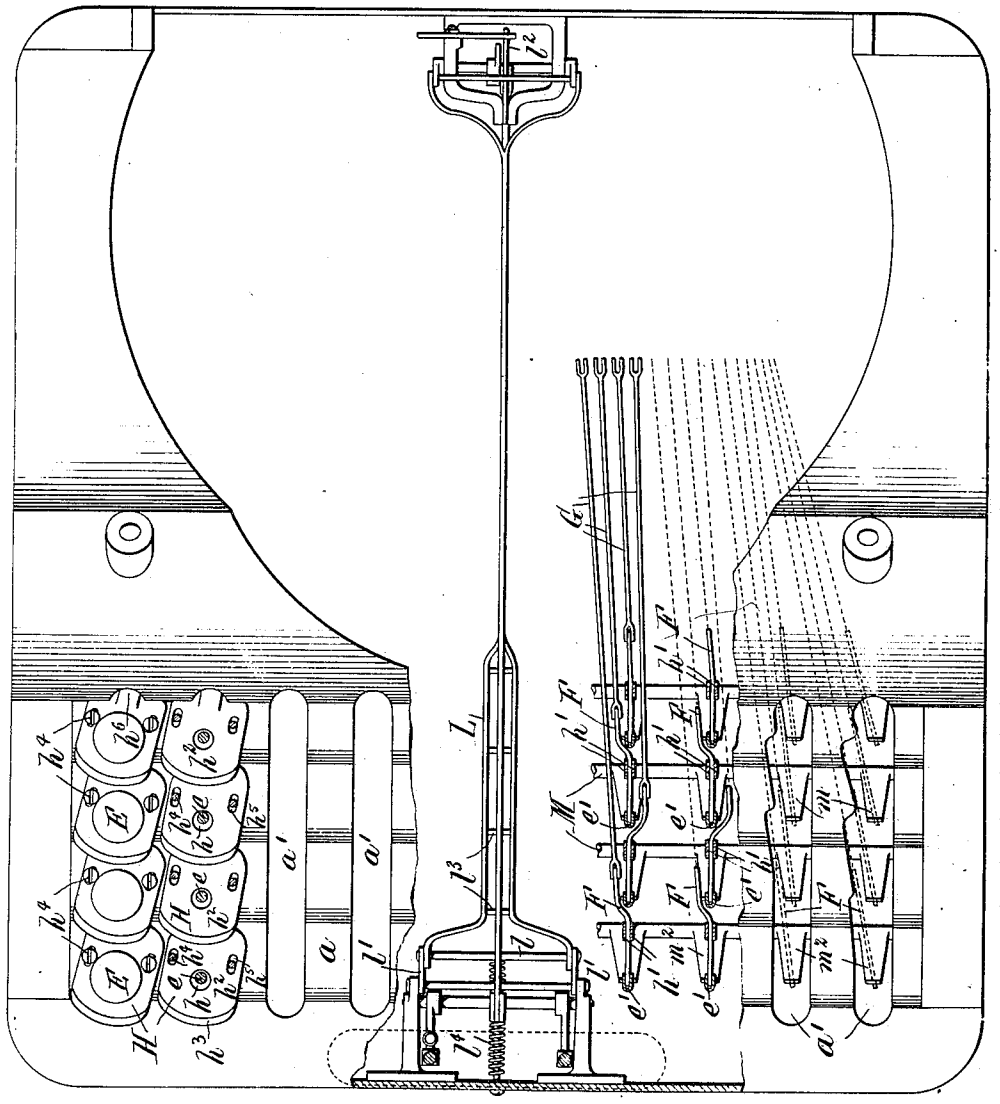

Fig. 1.

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3 SHEETS—SHEET 2.

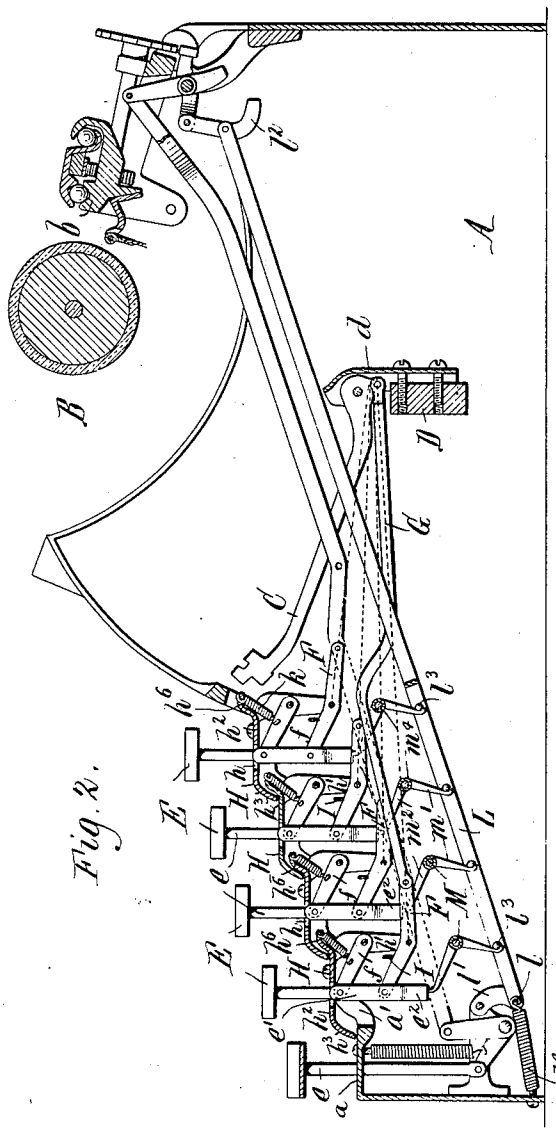

Fig. 2.

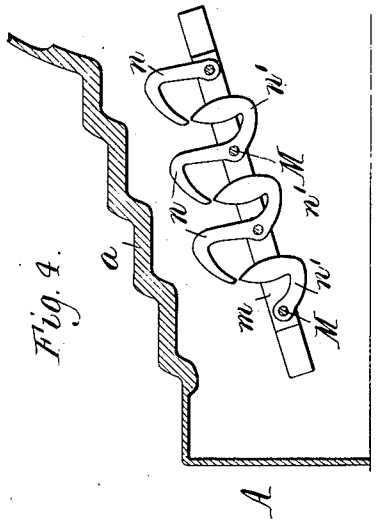

Fig. 4.

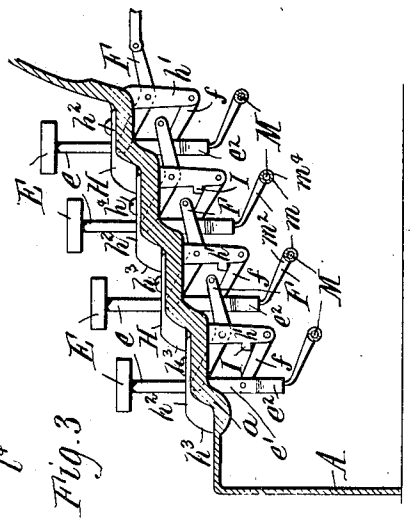

Fig. 3

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3 SHEETS—SHEET 3.

Fig. 5.

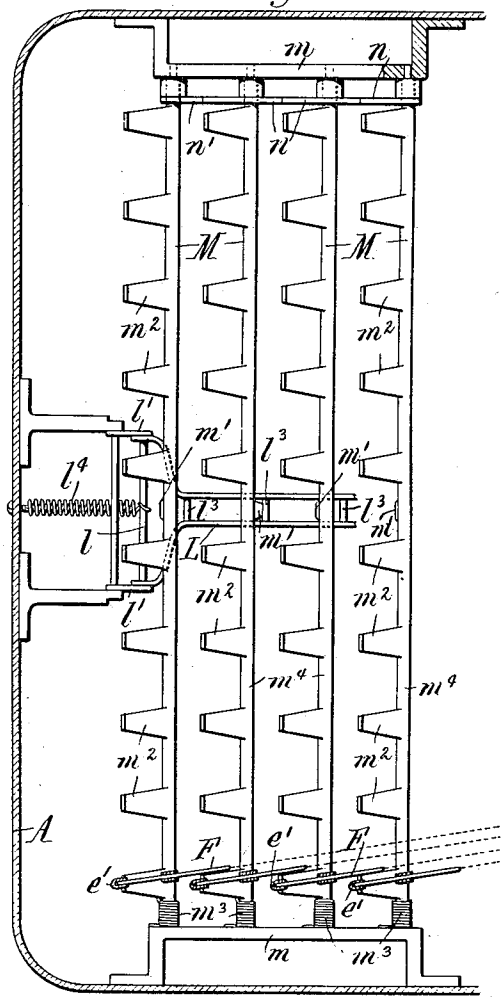


Fig. 6.

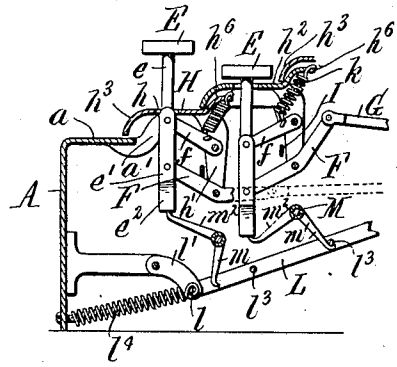


Fig. 7.

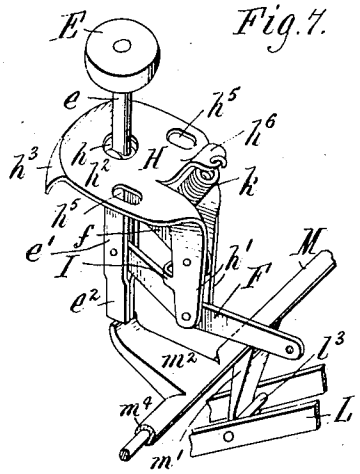


Fig. 8.

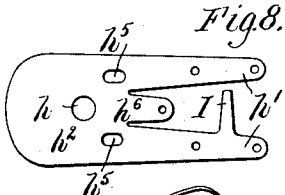


Fig. 11.

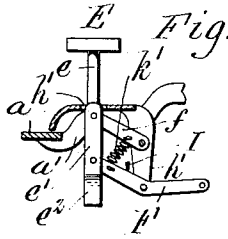


Fig. 9.

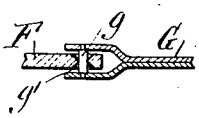
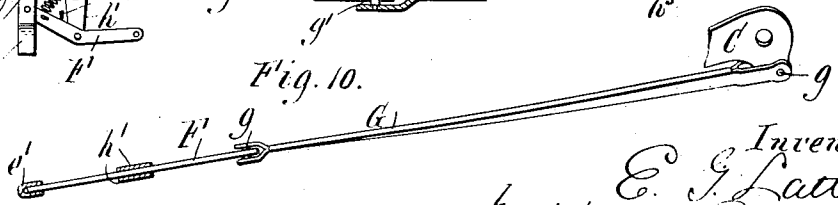


Fig. 10.



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K. W. Kinnow. } Witnesses:

UNITED STATES PATENT OFFICE.

EMMIT G. LATTA, OF FRIENDSHIP, NEW YORK, ASSIGNOR OF ONE-HALF TO HARVEY A. MOYER, OF SYRACUSE, NEW YORK.

TYPE-WRITING MACHINE.

No. 819,773. Specification of Letters Patent. Patented May 8, 1906.

Application filed January 17, 1905. Serial No. 241,456.

To all whom it may concern:

Be it known that I, EMMIT G. LATTA, a citizen of the United States, residing at Friendship, in the county of Allegany and State of New York, have invented a new and useful Improvement in Type-Writing Machines, of which the following is a specification.

This invention relates to type-writing machines, and more especially to type-bar actions for the so-called "front-strike" machines in which the type-bars are pivoted on a segment arranged below the platen and make the impressions at the front side of the platen, where they can be readily seen by the operator.

The principal objects of the invention are to produce an action in which the finger-keys all have a uniform dip, equal leverage, and are free from sliding friction, thus insuring a uniform light touch; to make the moving parts of the least weight consistent with strength and durability; to construct the action so as to prevent the type-bars from rebounding and making it impossible to simultaneously operate finger-keys in different banks on the keyboard, thereby minimizing the danger of collisions between the type-bars and rendering the action capable of the highest speed of operation, and to improve the type-bar actions of type-writing machines in the particulars hereinafter pointed out and set forth in the claims. These objects are accomplished in part by mounting the finger-keys without guides on parallel swinging links or levers and connecting them to their type-bars in such manner as to render the starting movement of the keys and type-bars slow and easy and cause the type-bars to move to the printing-point with a constantly-accelerating speed by so arranging the parts that the pivots joining each type-bar, its key-lever and their connecting-rod, and the fulcrum for the key-lever are all in line when the type-bar is in its normal rest position, thus locking the type-bar against rebounding, and by operating the universal bar by independent actuating parts, one for each bank of keys, either of which actuating part can be moved alone, but which interlock so as to prevent two adjacent parts from being moved together.

The type-bar action herein described and shown in the drawings is similar in some respects to that disclosed in United States Letters Patent No. 758,982, granted to me May 3, 1904, and may be considered as an improvement on said patented construction.

In the accompanying drawings, consisting of three sheets, Figure 1 is a fragmentary plan view of a type-writing machine embodying the invention, showing a portion of the frame, a portion of the fingers-keys and their brackets, a portion of the key-levers and connecting-rod, the universal bar, and portions of the actuating-shafts for the latter. Fig. 2 is a longitudinal sectional elevation thereof in line 2 2, Fig. 1, also showing parts of the carriage, type-bar segment and type-bars, and space-key and mechanism. Fig. 3 is a fragmentary sectional elevation of the keyboard in line 3 3, Fig. 1, showing the keys and associated parts at one side of the keyboard. Fig. 4 is a fragmentary sectional elevation showing the locking mechanism for the universal-bar-actuating shafts. Fig. 5 is a fragmentary view, partly in plan and partly in horizontal section, showing the universal-bar mechanism and a portion of the key-levers at one side of the keyboard. Fig. 6 is a fragmentary sectional elevation of the keyboard, showing one key depressed and the universal bar moved rearwardly. Fig. 7 is an enlarged perspective view of one of the finger-keys, its bracket, and associated parts. Fig. 8 is a plan view of a blank from which the key-brackets are made. Fig. 9 is a detail section of one of the pivot-joints for the connecting-rods. Fig. 10 is a sectional plan view of one of the finger-levers, connecting-rods, and a portion of one of the type-bars at the side of the segment. Fig. 11 is a detail sectional elevation showing a different arrangement of the key-retracting spring.

Like letters of reference refer to like parts in the several figures.

A represents the frame of the machine, which may be of any suitable shape and construction and has a stepped and slotted front portion *a*, forming a base for the keyboard; B, the platen, which, as usual, is journaled on a carriage which is moved transversely of the machine on a suitable guide and supporting track or bearings *b*; C, one of the type-bars which are pivoted on a segment D, arranged below the platen and swing upwardly and rearwardly to make the impression at the front side of the platen, and E, the finger-

keys, one of which is operatively connected to each type-bar by a key-lever F and connecting-rod G.

The finger-keys are preferably arranged in straight rows running both longitudinally and transversely of the keyboard, and each key and its lever are mounted on a separate bracket H, which brackets are alike and are separately secured to the stepped portion *a* of the frame and are independently adjustable thereon and separable therefrom. The brackets have portions which depend through the slots *a'* of the stepped base *a* to support the keys and key-levers. Each key has a vertical stem *e*, which passes through a hole *h* in its bracket and is connected to the depending legs of its bracket by the front arm of its key-lever F, and a lever or link *f*, which are pivoted to the key-stem and legs of the bracket and form parallel swinging links. The hole *h* is large enough to allow of the up and down movements of the key-stem without contact with the walls thereof, so that the key has no sliding contact with any guide or part, and its movement is therefore very free and easy. The key-levers may be located either below or above the links *f*. Each key-stem is preferably hollow, having an upper portion which is tubular, an intermediate portion *e'* of U-section or open at the rear side to receive the ends of the key-lever and link *f*, and a flattened or compressed lower end e^2, which engages and operates the actuating-shaft for the universal bar.

The key-brackets are preferably made from sheet-metal blanks of the shape shown in Fig. 8, which are bent into the form shown in Fig. 7. Each bracket has two depending legs *h'*, forming the support for the key-lever and link, and a horizontal or flat top h^2. The tops of the several brackets in each longitudinal row overlap, and thus cover the slots *a'* in the stepped base, and each top has a depending front flange h^3, which bears on the top of the bracket next below it in the row, as shown in Fig. 6, thus effecting a better closure for the slots. The brackets are adjustably secured to the stepped base by ordinary screws h^4, passing through elongated slots h^5 in the tops of the brackets. One of the legs of each bracket is provided with an integral projection I, which is bent transversely to lie in the path of the key lever or link *f* and form a back-stop to limit the return movement of the levers and keys. The levers and keys are retracted and the levers or links held against the stops I by simple helical springs *k*, connected to the levers or links and to lugs h^6, provided for the purpose at the rear portion of the tops of the brackets. Preferably the key-levers are arranged below the links at the central portion of the keyboard (see Fig. 2) and above the links at the sides of the keyboard, (see Fig. 3,) and intermediate of these locations the levers are arranged some one way and some the other, so as to position each lever and connecting-rod as nearly as possible in a horizontal line, with the pivot joining the connecting-rod to its type-bar. By thus arranging the key-levers all of the brackets can be made the same length and their manufacture is simplified. The effect is similar to that secured in the patented machine referred to by making some of the brackets longer than others and pivoting all of the levers at the lower ends of the brackets.

In order to enable the key-levers F at the sides of the keyboard to exert a straight pull on the type-bars, they and their brackets H are arranged obliquely, as shown, at the right side of the keyboard in Fig. 5, and this arrangement, owing to the greater width of the keyboard than the type-bar segment, is all that is required to prevent interference of the levers with each other and with the brackets. Some of the levers at the central part of the keyboard have their rear ends offset, as shown in Fig. 1, to clear the brackets in their rear, and some of the central connecting-rods G have their front ends bent or offset upwardly to pass over the actuating rock-shafts for the universal bar, as shown in Fig. 2. While the described arrangement of keys in straight rows longitudinally and transversely is preferred, they could be arranged in the more common diagonal rows, and in that case the central levers would not have to be offset.

The key-levers are so shaped and arranged that all of their front arms set at the same angle to the horizontal, thus insuring the same movement or dip of the finger-keys; but the levers are made in several different shapes—that is, the angularity of the arms is not the same in all of the levers, but such that the pivot joining each lever to its connecting-rod will lie exactly in a straight line connecting the central pivot or fulcrum of the lever and the pivotal joint of the type-bar with the connecting-rod when the type-bar is in its normal rest position. This is important and produces several desirable results: First, a rigid brace is formed that effectually prevents the type-bar from rebounding and overcomes the principal cause of collisions between the type-bar when operated at high speed; second, the type-bar is started very slowly and its motion is constantly accelerated until the type-bars strikes the platen; third, the operator's fingers are greatly relieved from shock upon first contact with the keys and the action is much less tiresome than if the maximum force were required for the initial movement of the keys. The second and third of these desirable results can be had by arranging the three pivots nearly in line; but the first can only be had in perfection by the exact alinement of the three pivots. If the central

pivot, that one joining the lever and connecting-rod, be arranged to lie slightly below the line of the other two, very nearly the same result is obtained; but in that case the key has to travel some distance before the type-bar is started, and it is desirable that the key move no farther than is necessary, and, moreover, if the said central pivot can move over the line to any perceptible extent it permits the type-bar to rebound somewhat at the time it passes the line. The back-stop I arrests the parts when the three pivot-joints are in exact line. The position of the stops I can be easily changed by bending the stops, and if the latter when the parts are assembled do not occupy a relation to properly arrest the levers as described the stops are adjusted by bending. The levers could be arrested when the three joints were alined by other means. For instance, a knuckle-joint between the lever and connecting-rod could be used with more or less advantage; but the stop on the bracket is preferable, as it enables a lighter construction of the moving parts and can be adjusted as found necessary.

The parallel links or the link and front arm of the key-lever are arranged to support the key-stem in front of that part of the frame to which the link and lever are pivoted, and the rear arm of the key-lever in all cases, whether over or under the link, swings upwardly and forwardly. This is important when the key-lever is connected to the type-bar of a front-strike machine by a rod extending in substantially a direct line from the bar to the key-lever pivot, as it causes both ends of the rod to swing upwardly and forwardly and produces a better acceleration of motion in the bar. This is especially the case when the type-bars are pivoted in a higher plane than the key-lever pivots, as they preferably are in this type of machine.

The construction shown in Fig. 11 is similar to that described, except that the retracting-spring k' for the key connects the key-lever F and link f in such manner as to be strained when the key is depressed.

It is desirable that there be no lost motion or looseness in any of the three joints by which the key-levers are connected to the type-bar and brackets, and for this reason the usual universal joints or other connections used to connect two movable parts working on pivots that are not parallel is not desirable. The pivots that connect the levers to the brackets are substantially parallel with the pivots of the type-bars in the center of the segment; but at the outer ends of the segment the lines diverge considerably, and this is provided for by twisting the connecting-rods so that the ends face the ends of the levers and type-bars, as shown in Fig. 10, and providing an improved joint (shown in Fig. 9) which allows the necessary slight change in position during the movement of the parts. In this joint the ends of the connecting-rod (which is preferably formed of a folded strip of metal) are spread open wider than the thickness of the type-bar or lever and are connected to the bar and levers by shouldered hardened rivets g, which pass through holes g' in the lever and type-bar and hold the ends of the rod from being closed, so as to allow a slight twisting movement of the parts. The hole for the rivet is countersunk from both sides, leaving its central part to fit the rivet, which permits the slight twisting movement required without perceptible looseness, and as the perforated ends of the type-bars and levers are hardened the joint gives long service without serious wear or friction.

The type-bars are preferably pivoted to bearing-hangers d, which are separately secured to and adjustable on the segment, such as described in my application for United States Letters Patent, filed October 31, 1904, Serial No. 230,655, and the type-bar, connecting-rod, key-lever, bracket, retracting-spring, and key-stem are all permanently connected before assembling in the machine. As there is no adjustable connection in these parts, they cannot work loose, and the weight of the parts as a whole is very little compared with their strength and durability, and there is the minimum inertia to overcome, making great speed possible.

Separate adjustable key-brackets of the kind described are preferably employed, and the finger-keys are preferably mounted in the brackets, as described; but, as will be apparent, the pivot-joints for the key-lever, connecting-rod, and type-bar can be arranged to aline in the rest position of the type-bar and produce the described results irrespective of the particular construction of the key-bracket or manner of mounting the key. Thus similar results can be effected in the construction disclosed in my said patent, No. 758,982, in which the keys are slidably mounted by properly arranging the angularity of the bell-crank levers and providing back-stops.

The universal bar instead of being actuated directly by all of the finger-keys is operated by separate independent actuating parts or rock-shafts, of which there is one for each bank or transverse row of the finger-keys.

L represents the universal bar, which is arranged at the central portion of the machine, extending from front to rear and preferably inclining upwardly toward the rear. The bar shown consists of two strips of sheet metal arranged side by side with their front ends spread apart and pivoted on a rod l, connecting two swinging links l', pivoted to suitable brackets on the front of the frame, while the rear end of the rod is pivoted to a rock-arm l^2, that trips the carriage-escapement (not shown) by a rearward thrust of the bar.

Where the bar underlies the keyboard, its strips are spaced apart and connected by a series of transverse rivets l^3, which are engaged by arms on the actuating-shafts to operate the universal bar. The rear portion of the universal bar, is narrow and preferably passes over the type-bar segment between the two central type-bars; but it could be offset to pass under the type-bar segment, if desired. The purpose of spreading the front end of the universal bar is to better hold it from twisting. The bar is pulled forwardly and returned after actuation by a coil-spring l^4, connecting the supporting-rod for its front end to the front of the frame.

The actuating rock-shafts M for the universal bar (see Fig. 2) are arranged transversely under the keyboard, one directly beneath the fulcra of each transverse row of key-levers, and are journaled at their ends in suitable bearings m at the sides of the frame. Each rock-shaft has a depending central arm m', which bears against one of the rivets l^3 of the universal bar, and a number of arms m^2 equal in number to the finger-keys in one bank, which project forwardly and upwardly parallel with the front arms of the key-levers and bear at their reduced ends against the lower ends of the stems of the finger-keys in the bank above the rock-shaft. The rock-shafts are provided with suitable springs m^3, Fig. 5, which return them to and hold them in the normal position shown in Fig. 2. When a finger-key is depressed, it rocks the rock-shaft M beneath it and thrusts the universal bar rearwardly, as indicated in Fig. 6, to trip the carriage-escapement.

The rock-shafts M are arranged directly beneath the fulcra of the key-levers, and their arms m^2 are parallel with the front arms of the key-levers and of the same length. Consequently the arms m^2 and front arms of the key-levers act as parallel links, and there is no sliding movement of the reduced ends of the arms m^2 on the lower ends of the key-stems. There is simply a pivotal movement of the arms m^2 on the key-stems, and the friction between the parts is negligible, rendering the movement of the keys very easy. The universal bar is direct in its action and with one of the actuating rock-shafts is of less weight and easier to operate than the usual one-part universal bar common to all of the finger-keys. The arms m' m^2 of each rock-shaft are preferably formed by integral projecting portions of a strip of sheet metal m^4, which is stamped into form and surrounds and is secured to a straight rod or wire.

The rock-shafts M are provided with interlocking parts (shown in Figs. 4 and 5) to prevent two adjacent shafts from being rocked together, while allowing the independent movement of each shaft. The means shown for this purpose consist of arms n n' on the shafts, preferably at one end thereof, each having an edge curved concentrically with its shaft. The arms are so related, as shown in Fig. 4, that either shaft can be rocked when the adjacent shaft is in its normal position, while the arms of adjacent shafts will interlock and stop the shafts if two adjacent shafts start to move together or one shaft is out of its normal position when it is attempted to move the next shaft. Thus if two finger-keys in adjacent banks are accidentally struck simultaneously neither can be moved and the type-bars controlled thereby cannot be operated and interlocked.

I claim as my invention—

1. The combination in a front-strike type-writing machine, of a vertically-movable key-stem, a lever pivoted to the key-stem and fulcrumed to a fixed part of the machine in rear of the key-stem, a pivoted type-bar, and a rod connecting the type-bar and said lever, said rod being pivoted to said lever at a point normally lying substantially on a straight line joining the fulcrum of said lever and the pivot connecting said rod to said type-bar, and said rod swinging forwardly and upwardly throughout its length when the key-stem is depressed, substantially as set forth.

2. The combination in a type-writing machine having type-bars arranged to swing upwardly and rearwardly, of a series of vertically-movable key-stems, a pair of links pivotally connected to each key-stem at different elevations and to a fixed part of the machine in rear of the key-stem, and a rearwardly-extending arm on one of said links operatively connected to a type-bar, each key-stem being supported by a separate pair of links and connected to a separate type-bar, substantially as set forth.

3. The combination in a type-writing machine having a type-bar arranged to swing upwardly and rearwardly, of a vertically-movable key-stem, a pair of parallel links arranged one over the other and pivoted to the key-stem and fulcrumed to a fixed part of the frame in rear of the key-stem, a rearwardly-extending arm on one of said links, and a rod pivotally connected to the type-bar and to said arm, said rod and the pivots connecting it with said arm and with the type-bar and the fulcrum for said link normally lying substantially in the same straight line, substantially as set forth.

4. The combination in a type-writing machine, of a type-bar pivoted to swing upwardly and rearwardly, an upright finger-key, a pair of pivoted links arranged at different elevations and pivoted to and supporting the finger-key in upright position, and a one-part connection between one of said links and the type-bar, substantially as set forth.

5. The combination in a type-writing machine, of a pivoted type-bar arranged to swing upwardly and rearwardly, an upright

finger-key, a pair of pivoted supporting-links for the finger-key arranged at different elevations and pivoted to the finger-key, a spring for elevating the finger-key, and a one-part connection between one of said links and the type-bar, substantially as set forth.

6. The combination in a type-writing machine, of a pivoted type-bar, an upright finger-key, a pair of pivoted supporting-links for the finger-key arranged at different elevations and pivoted to the finger-key, and a rod connecting one of said links with said type-bar and extending substantially in the direction of a straight line connecting the pivot for said link with the pivot joining said rod to the type-bar, substantially as set forth.

7. The combination in a front-strike type-writing machine, of a pivoted type-bar arranged to swing upwardly and rearwardly, a vertically-movable key-stem, a lever centrally pivoted to the frame with one arm pivoted to the key-stem, and a connecting-rod extending in a substantially direct line from the type-bar to the frame-pivot of said lever and pivotally connected to the other arm of said lever on such line, substantially as set forth.

8. The combination in a type-writing machine, having a series of type-bars pivoted on an upright segment, and a keyboard in front thereof, of a series of vertically-movable key-stems each supported by two pivoted links, the upper links for the key-stems in the side portions of the keyboard having extensions connected to the type-bars near the ends of the segment, substantially as set forth.

9. The combination in a type-writing machine having a series of type-bars pivoted on an upright segment, and a keyboard in front of the type-bars, of a series of vertically-movable key-stems each supported by two pivoted links one above the other, connections between the lower links for the central key-stems and the central type-bars, and connections between the upper links for the side key-stems and the side type-bars, substantially as set forth.

10. The combination in a type-writing machine, having a series of pivoted type-bars, and a series of vertically-movable key-stems, of a pair of pivoted supporting-links for each type-bar, all of the links being arranged at the same angle, and one link of each pair having an extension connected to a type-bar, the angularity of said extensions varying as required to connect them with the type-bars in direct lines, substantially as set forth.

11. The combination in a type-writing machine, of a vertically-movable key-stem having two pivot bearings or seats, an upright support having two corresponding bearings, a pair of interchangeable links of different form connecting the key-stem to the support, a type-bar, and operative connections between the key-stem and type-bar, substantially as set forth.

12. The combination in a type-writing machine, of a vertically-movable key-stem, a pair of parallel links pivotally supporting the key-stem, a detachable bracket pivotally supporting the parallel links, a type-bar, and operative connections between the key-stem and type-bar, substantially as set forth.

13. The combination in a type-writing machine, of a vertically-movable key-stem, a pair of parallel links pivotally supporting the key-stem, an adjustable bracket pivotally supporting the parallel links, a type-bar, and operative connections between the key-stem and type-bar, substantially as set forth.

14. The combination with a type-writing-machine frame, of a vertically-movable key-stem, a connecting-bracket formed of a single piece of sheet metal and having an integral back-stop for the key-stem, a pair of supporting-arms pivoted to both the key-stem and the bracket, a type-bar, and operative connections between the key-stem and type-bar, substantially as set forth.

15. The combination of a type-writing-machine frame having a slotted keyboard-base, a series of pendent key-supporting brackets arranged in each slot and independently adjustable therein, the brackets in each slot having parts which coöperate to cover said slot, finger-keys, type-bars, and operative connections between the finger-keys and type-bars, substantially as set forth.

16. The combination with a type-writing-machine frame, having a slotted keyboard-base, of a series of key-supporting brackets arranged in said slots and having overlapping parts that cover the slots in the base, finger-keys, type-bars, and operative connections between the finger-keys and type-bars, substantially as set forth.

17. The combination with a type-writing-machine frame, having a slotted keyboard-base, of a series of key-supporting brackets, and a key-stem, lever, connecting-rod, type-bar, and type-bar hanger permanently connected with each bracket and adapted to be removed with said bracket through the slot of the base, substantially as set forth.

18. The combination in a type-writing machine, of a series of reciprocating keys arranged in banks or rows, an independent movable member for each row of keys having parts for actuation by the several keys in the row, and a universal bar which is actuated by each of said members, substantially as set forth.

19. The combination in a type-writing machine, of a series of key-stems supported to move up and down and arranged in banks or rows, a series of rock-shafts arranged one for each bank of key-stems and having an arm in position to be vibrated by each of the key-

stems, and means for transmitting the movement of each rock-shaft to the carriage-escapement, substantially as set forth.

20. The combination in a type-writing machine, of reciprocating key-stems arranged in banks or rows, supporting-links pivoted to the key-stems and to fixed parts of the machine, a rock-shaft for each bank of key-stems supported directly under the pivots by which the links are secured to the frame, arms projecting from the rock-shaft substantially parallel with the supporting-links and pivotally engaging the key-stems and adapted to rock the shaft with each vibration of either key in the bank, and means for transmitting the movement of the rock-shafts to the carriage-escapement, substantially as set forth.

21. The combination in a type-writing machine having a series of reciprocating keys arranged in banks or rows, of a series of rock-shafts each in operative relation with the keys of one row, and a universal bar arranged to move with either rock-shaft of the series independently of the other rock-shafts, substantially as set forth.

22. The combination in a type-writing machine having a series of reciprocating key-stems, and type-bars operatively connected with said key-stems, of a rock-shaft for the purpose stated having arms with reduced ends bearing against the lower ends of the key-stems, substantially as set forth.

23. The combination in a type-writing machine having an upright segment for the type-bars, and a keyboard arranged in front thereof, of a universal bar passing in a direct line from the under side of the keyboard over the central part of the segment to the carriage-escapement, substantially as set forth.

24. The combination in a type-writing machine having a series of type-bars and two or more rows or banks of operating finger-keys for said type-bars, of a rock-shaft for each row of keys, and interlocking means to prevent the actuation of two adjacent shafts at the same time, substantially as set forth.

25. The combination in a type-writing machine having a series of type-bars and two or more rows or banks of operating finger-keys for said type-bars, of two or more rock-shafts each arranged to rock independently of the others upon the actuation of a key in one row, and means to cause the rock-shafts to interfere in case keys in any two adjoining rows are actuated at the same time.

Witness my hand this 14th day of January, 1905.

EMMIT G. LATTA.

Witnesses:
C. W. PARKER,
EDWARD C. HARD.