

J. D. DAUGHERTY.
TYPE WRITING MACHINE.
APPLICATION FILED OCT. 21, 1905.

1,011,924.

Patented Dec. 19, 1911.

3 SHEETS-SHEET 1.

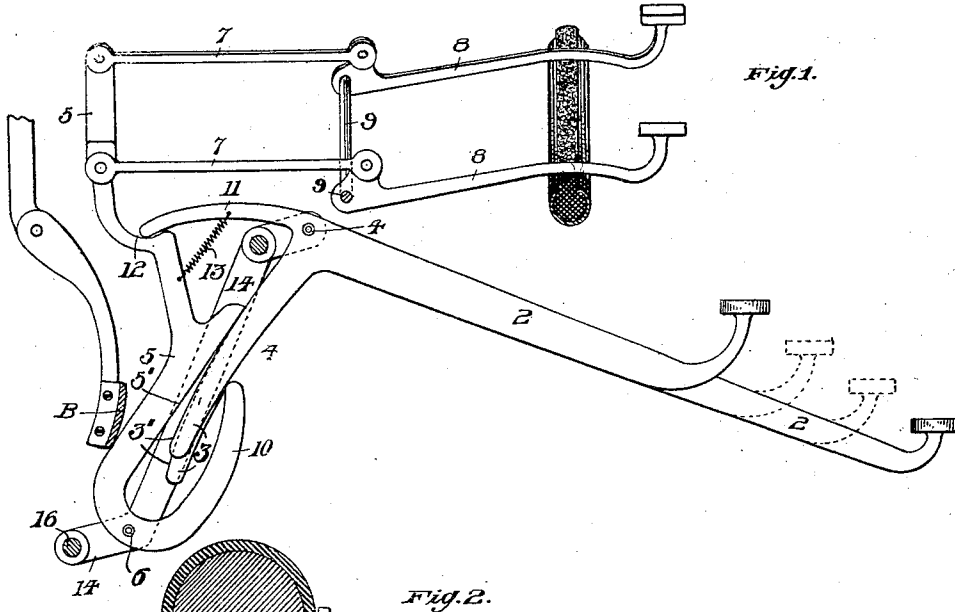


Fig. 1.

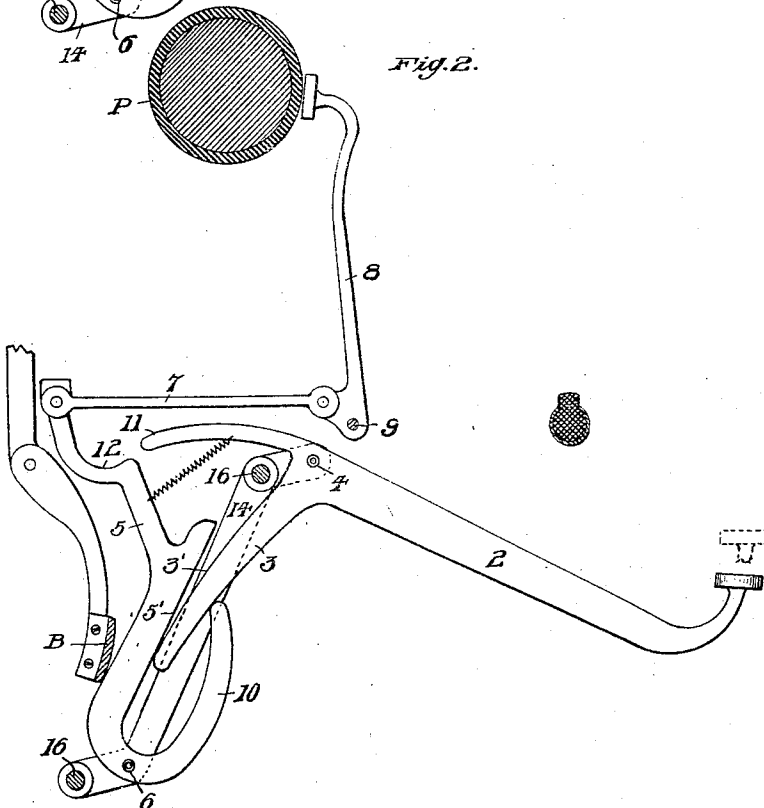


Fig. 2.

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3 SHEETS--SHEET 2.

Fig.3.

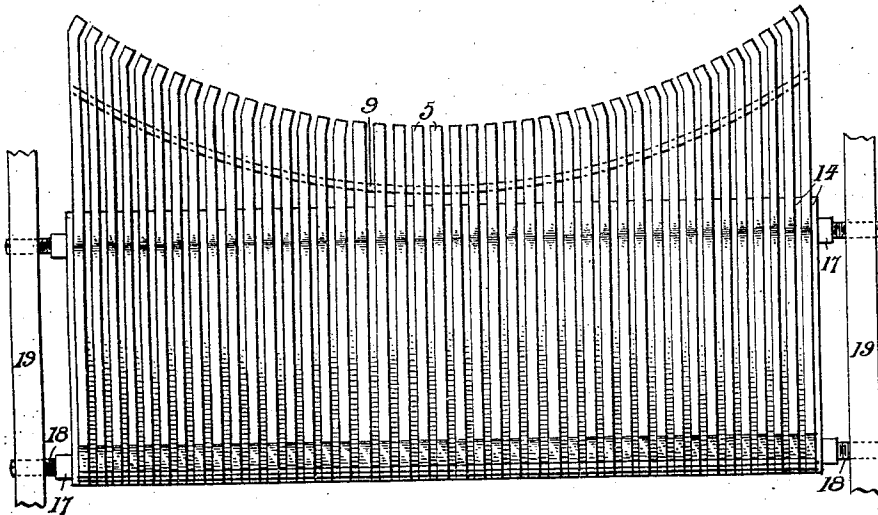


Fig. 4.

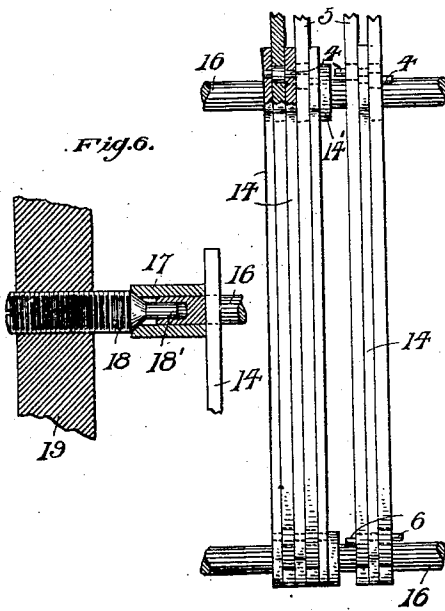
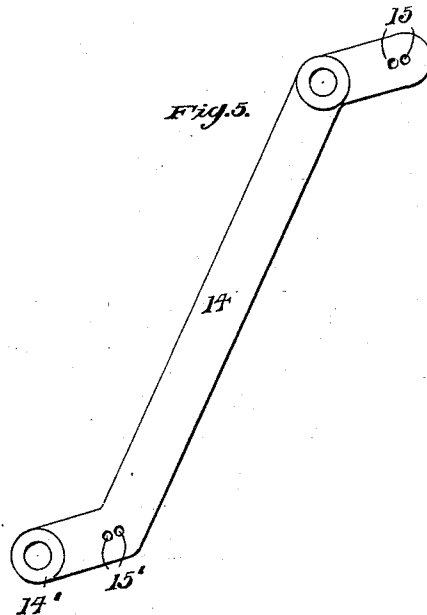


Fig. 5.



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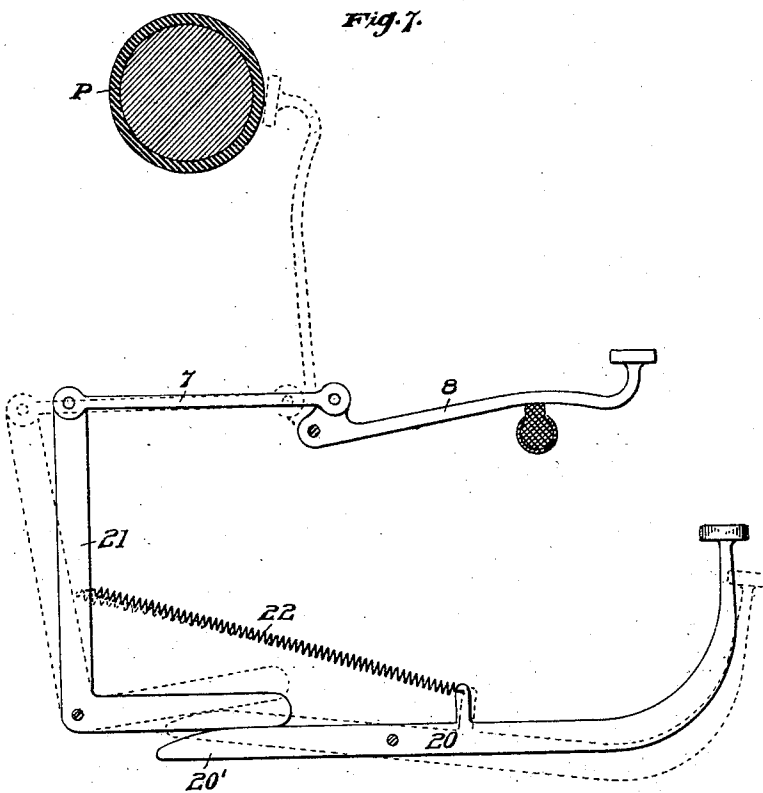
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3 SHEETS-SHEET 3.



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UNITED STATES PATENT OFFICE.

JAMES DENNY DAUGHERTY, OF KITTANNING, PENNSYLVANIA, ASSIGNOR TO UNION TYPEWRITER COMPANY, A CORPORATION OF NEW JERSEY.

TYPE-WRITING MACHINE.

1,011,924.

Specification of Letters Patent.

Patented Dec. 19, 1911.

Application filed October 21, 1905. Serial No. 283,758.

To all whom it may concern:

Be it known that I, JAMES DENNY DAUGHERTY, a citizen of the United States, residing at Kittanning, in the county of Armstrong and State of Pennsylvania, have invented certain new and useful Improvements in Type-Writing Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

While the key of a writing machine is depressed at an approximately uniform speed throughout its stroke, it is desirable that the type-bar shall start from its position of rest at relatively low speed and increase as the type approaches the impression surface. Such arrangement insures rapid action and positive clearance of the type-bar. In embodying this principle in my improved type-action, I have so arranged the cooperating key and type-actuating levers that while the key lever is being depressed the point of engagement between the levers shifts in such manner as to move the type-actuating lever at increasing speed. As the levers of the several banks of keys of a writing machine vary in length, their throw varies if a uniform depression is maintained throughout the several banks. In my improved type action this variation, as well as variations in the throw of the type-actuating levers of different lengths, is provided for by varying the shifting engagement of the cooperating levers.

A further purpose of the invention is to provide for holding the cooperating levers in positive engagement at all times without interfering with their independent movement, thereby avoiding lost motion and preventing the type-bars from jumping or rebounding from their position of rest.

Still a further purpose is to provide improved means for mounting the type-action levers, one of the advantages incident thereto being that any lever may be removed and replaced without disturbing the other levers.

In the accompanying drawings, Figure 1 is a view in elevation of the improved type action at rest, two key levers, one of the shortest and one of the longest, being shown. Fig. 2 is a similar view of a single set of the type-action levers, showing the position

when making an impression. Fig. 3 is a rear elevation of the type-actuating levers and bearing plates. Fig. 4 is a detail view of the same. Fig. 5 is a face view of one of the bearing plates. Fig. 6 is a sectional view of the mechanism for adjusting and securing the bearing plates. Fig. 7 illustrates a type action of modified form.

In the preferred embodiment of the invention the key levers are of bell-crank or angular form, the key arms 2 thereof being arranged in a suitable number of banks, four being here shown.

3 designates the depending motion-transmitting arm of each key lever, having its rear edge 3' of convex or rocker form, as shown.

4 is the lever-fulcrum.

Coöperating with each key lever is an auxiliary or type-actuating lever or sub-lever 5, having fulcrum 6 at its lower end and at its upper end connected by link 7 with type-bar 8. The normal position of the latter is approximately horizontal, the same being pivoted on segmental rod 9 and arranged to strike against the front of platen P. Levers 5 vary in length, their upper ends forming a segmental line as shown in Fig. 3, which is complementary with the segmental series of type-bars. Each of the levers 5 is preferably furcated or bifurcated and has a straight edge contact-face 5', with which the curved contact-edge 3' of the arm 3 engages, thereby providing a rocking or rolling contact or engagement between the two members 3 and 5 of each type action. The same result may be secured by curving edge 5' instead of 3', or by curving both of said edges. The arrangement is such that when the key lever is at rest, the upper portion of lever-edge 5', or that part farthest from fulcrum 6, is in engagement with rocker edge 3' at a point which is nearer fulcrum 4 than at any other time. During the depression of the key lever, said point of engagement shifts away from fulcrum 4 and toward fulcrum 6, with the result that notwithstanding a uniform downward movement of the key, lever 5 is actuated at increasing speed, a speed which is slowest when the type-bar starts from its position of rest and most rapid when the type is in close prox-

imity to the platen. This arrangement affords a very rapid action and provides for moving each type-bar into and out of the common path very quickly and prevents interference. With a uniform key depression, it is obvious that those levers having their keys farthest from fulcrum 4 have the least throw, while those nearer the fulcrum have a greater throw. This variation in throw is compensated for by varying the length of lever-arms 3, said arms being shortest on those levers having the greatest throw, and longest on those having the least throw. Hence, the lower extremity of arm 3 of the key levers of the uppermost bank is farthest removed from fulcrum 6, while the extremities of arms 3 carried by the levers of the lowermost bank and which have the least throw, depend more nearly to fulcrum 6. One of the shortest and one of the longest key levers are illustrated in Fig. 1, the same belonging to the top and bottom banks respectively. The levers of the intermediate banks vary proportionately. With the arrangement described, any two of levers 5 of the same length will be given the same throw even though one may be operated by one of the shortest of arms 3 and the other by one of the longest of said arms.

To provide for uniform throw of type-bars 8 which are connected to the upper ends of levers 5, which latter vary in length, it is necessary to move said levers distances which vary in proportion to their lengths. To accomplish this, the curvature of arm-edges 3' operating on the longer levers 5 is sharper or more retreating than the corresponding edges of those arms which engage the shorter levers 5. Variations in length and curvature of all of arms 3 for an organized machine may be readily calculated and thus so standardized that a machine is in practically perfect adjustment as soon as its parts are assembled.

The cooperating key and type-actuating levers are maintained in positive relation by an arm 10 projecting upwardly from the lower end of lever 5 and forming one arm of the bifurcated portion thereof which bifurcated portion receives and embraces the lower portions of arm 3 of the key lever on opposite sides, the arrangement being such that the upper extremity of arm 10 is in constant engagement with the front or under edge of arm 3. Projecting from the key lever at a point adjacent fulcrum 4 is arm 11, which when the key lever is at rest engages an offset 12 of lever 5, the effect of which is to hold the levers positively interlocked when at rest, preventing the type-bars from rebounding or dancing after making an impression. The return movement of the levers is accelerated by spring 13. The carriage feeding mechanism (not shown) is actuated by universal bar B which

normally bears against the rear edges of type-actuating levers 5, and is deflected backwardly by one of said levers each time an impression is made.

While the fulcrums for the type-action levers may be variously arranged within the machine frame, I prefer to mount each set of levers between two laterally movable bearing-members which are in the form of spacing strips or plates 14 and constitute a hanger. As many of these strips or plates are provided as may be necessary to form the requisite number of spaces between them for the reception of the different sets of levers, the adjacent plates having at their upper ends alining apertures 15 to receive pivot or fulcrum pins 4 projecting from opposite sides of each key lever, said plates having similar apertures 15' in their lower portions to receive corresponding fulcrum pins 6 projecting from levers 5. The fulcrum pins are fixed to the levers and loosely fit the said apertures, so that one or both of said levers may be readily removed or replaced by sufficiently separating plates 14 to pass said pins therebetween. The pivots of adjacent levers 5 are arranged in staggered relation so that they may correspond in length to the thickness of plates 14 without interfering with each other. Plates 14 are apertured to receive rods 16 upon which they are strung, with suitable heads or washers 14' therebetween to insure proper spacing, the series of bearing plates thus assembled being confined by sleeves 17 movable over and projecting from the ends of rods 16, each sleeve being engaged by a screw 18, adjustable through a frame-member 19. The extremities of rods 16 are apertured to receive the reduced portions 18' of screws 18, thereby providing supports for the rods and at the same time the necessary adjusting and securing means for the series of plates. The engaging surfaces of sleeve 17 and screw 18 are preferably tapered or beveled as shown. To remove any one of the type-action levers, it is only necessary to retract screws 18 on one or both sides of the machine sufficiently to permit of the bearing-plates being crowded apart or separated far enough to permit the lever with its fulcrum pin to pass outward, this being done without detaching the other levers.

While I have shown and described my preferred form of type-action levers, the same may be variously constructed and arranged without departing from the invention. Thus, in Fig. 7, the key lever 20 may be substantially straight with its end-portion 20' made to cooperate by a shifting and rocking action with one arm of a type-actuating lever 21 of bell-crank form. A spring 22 may be provided for maintaining the normal position of the levers. In this construction, as in that first described, the

type-actuating lever is moved at increasing speed, the point of contact between the levers shifting toward the type-actuating lever fulcrum and away from the key lever fulcrum while the latter is being depressed.

I claim:—

1. In a type action, a key lever and a type-actuating lever both arranged in the same general plane and in direct shifting engagement, one of the levers having an extended part embracing the other lever for holding the levers in constant and positive engagement.

2. In a type action, a key lever having a projecting arm, a type-actuating lever embracing and in positive shifting engagement with the key lever arm, whereby one lever cannot move independently of the other, and a type bar independent of but actuated by said type-actuating lever.

3. In a type action, a bell-crank key lever, and a type-actuating lever in shifting engagement with one arm of the key lever between the lever fulcrums, the type-actuating lever having an extended part embracing said key lever arm for holding the levers in engagement.

4. In a type action, a key lever and a type-actuating lever in shifting engagement, and an arm extending from the key lever adapted to engage the type-actuating lever when the key lever is in the normal position.

5. In a type action, a bell-crank key lever fulcrumed adjacent the juncture of its arms, one of said arms extending downwardly, a type-actuating lever in operative engagement with said downwardly extending arm, and an arm extending rearwardly from the key lever fulcrum adapted to interlock with the type actuating lever when the levers are in normal position.

6. In a type action, a key lever, a type-bar, an auxiliary lever fulcrumed at one end and at its opposite end operatively connected to the type-bar and between its ends in shifting engagement with the key lever, an arm on the auxiliary lever embracing the key lever, and an arm on the key lever adapted to interlock with the auxiliary lever when the key lever is in the normal position.

7. In a type action, a key lever, a type-actuating lever operatively connected to the key lever, an arm on the key lever, and an arm-engaging point on the type-actuating lever adapted to be engaged by said arm when the levers are in normal position.

8. In a type action, a key lever, a type-actuating lever operatively connected to the key lever, an arm on the key lever adapted to interlock with the type-actuating lever when the levers are in normal position, and a spring connected at one end to the type-actuating lever and at its opposite end to

said arm and adapted to resist movement of the levers from normal position.

9. In a type action, a series of banks of key levers, type-actuating levers in rocking engagement with the key levers, the rocking engagement of the key levers of the several banks being of different extent.

10. In a type action, a series of banks of key levers, type-actuating levers in rocking engagement with the key levers, the rocking engagement with the key levers of each bank being different and depending on the length of the associated actuating levers.

11. In a type action, key levers, type-actuating levers of different lengths in rocking engagement with the key levers, the pitch or curvature of the engaging members varying with the length of the actuating levers.

12. In a type action, a series of banks of key levers, each lever having a key arm and a motion transmitting arm, the respective arms of the levers of each bank being of corresponding lengths, said arm lengths differing in the different banks, and type-actuating levers in shifting engagement with the motion-transmitting arms of the key levers.

13. In a type action, key levers each having a key arm and a curved motion-transmitting arm, type-actuating levers of different lengths in rocking engagement with said curved motion-transmitting arms, the curvature of the latter varying with the varying lengths of type-actuating levers.

14. In a type action, a series of banks of key levers, each lever having a key-arm and a curved motion-transmitting arm, the corresponding arms of the different levers of each bank being of corresponding length, said arm-lengths differing in the different banks, and type-actuating levers in rocking engagement with said curved motion-transmitting arms, the curvature of the latter varying with the varying lengths of type-actuating levers.

15. In a writing machine, a support, a series of spacing members strung thereon, adjustable securing means common to all the spacing members whereby the members may be either clamped together or loosened for the separation of any two adjacent members, and type action levers mounted between adjacent members and removable therefrom when the members are loosened.

16. In a writing machine, a frame, rods therein, a series of plates loosely strung upon the rods, type action levers between and removably fulcrumed to adjacent plates, and plate clamping means operating when relaxed to afford the plates sufficient lateral movement on the rods to permit of the removal of the levers from between the plates without removing the plates and rods from the frame.

17. In a type action, separable plate-like spacing members, and a key lever and a type-actuating lever in shifting engagement between said members and fulcrumed thereto.

18. In a writing machine, two rods forming a support, a series of spacing members strung upon the rods, adjustable holding means for the members whereby any two of them may be separated for the removal or insertion of a type action lever, and a key lever and its associated type-actuating lever mounted between adjacent members and adapted to be removably held thereby.

19. In a writing machine, rods, a series of laterally movable bearing members mounted side by side on the rods, securing means for rendering said members laterally movable at will, and a key lever and a type-actuating lever between different portions of adjacent members and removably fulcrumed thereto.

20. In a writing machine, a frame, transverse rods within the frame,—one higher than the other,—upright plates loosely strung upon the rods, means for securing the plates, key levers fulcrumed between the upper portions of the plates, and type-actuating levers fulcrumed between the lower portions of the plates and in operative engagement with the key levers.

21. In a writing machine, a series of upright combined spacing and bearing members, type-actuating levers fulcrumed between the lower portions of adjacent members, key levers fulcrumed between the upper portions of adjacent members, each key lever and its associated type-actuating lever having cooperating bearing faces of such form as to create a rolling contact when the key lever is moved.

22. In a writing machine, a series of upright combined spacing and bearing members, type-actuating levers fulcrumed at their lower ends between the lower portions of adjacent members, and bell-crank key levers fulcrumed between the upper portions of adjacent members with an arm of each lever depending between the members, said arm and the associated type-actuating lever having cooperating faces formed to create a rolling contact when the key lever is moved.

23. In a type action, a key lever and a type actuating lever mounted to swing in the same plane and in direct and constantly positive interlocking shifting engagement with each other.

24. In a writing machine, rods, bearing members movable on the rods, type-action levers between and fulcrumed to adjacent members, sleeves movable on the rod-ends and projecting therefrom, and adjusting means engaging the sleeves.

25. In a writing machine, rods having

apertured ends, bearing members movable on the rods, type action levers between and fulcrumed to adjacent members, sleeves movable on the rod-ends and projecting therefrom, and adjusting screws engaging the sleeves and having reduced ends which enter the rod apertures.

26. In a type action, a key lever and a type-actuating lever in direct and constantly positive interlocking engagement, the key lever having a rolling contact with the type actuating lever.

27. In a type action, a key lever and a type-actuating lever, one of said levers having a rolling contact with the other and one of the levers having an extended part embracing the other lever for holding the levers in constant and positive engagement.

28. In a typewriting machine, the combination of a series of sub-levers, a series of key levers of different length having a rolling engagement therewith, the length of the engaging arms of the key levers being increased or decreased proportionately to the increase or decrease in the length of the key carrying arms of said key levers.

29. In a typewriting machine, the combination of a series of upright sub-levers which are gradually longer as the sides of the system are approached, a series of cooperating key levers of different lengths engaging said sub-levers, the length of the engaging arms of the key levers varying proportionately with the variation in the length of the key carrying arms of said levers, and a curved contact face between each pair of cooperating levers, the curvature of the contact faces varying according to the lengths of the sub-levers to afford a uniform dip of the keys and a uniform extent of movement of the actuating ends of the sub-levers.

30. In a typewriting machine, the combination of a type bar, a sub-lever, and a key lever that has a rolling engagement therewith, said sub-lever having portions that engage the key lever on opposite sides thereof.

31. In a typewriting machine, the combination of a type bar arranged to swing upwardly and rearwardly, a substantially upright furcated sub-lever pivotally supported at its lower end and operatively connected at its upper end to the type bar, and a key lever having a substantially upright part in contact with the front side of said sub-lever at the furcated portion thereof and acting to vibrate the sub-lever from its normal position with an accelerated motion.

32. In a typewriting machine, a type-bar arranged to swing upwardly and rearwardly, a pivoted upright auxiliary lever operatively connected to the type-bar at its upper end, a key lever having an upright part in rolling contact with the auxiliary lever, and means whereby the key levers

resist the movement of the type bars and auxiliary levers when the key levers are at their normal positions.

33. In a typewriting machine, a type bar 5 arranged to swing upwardly and rearwardly, a pivoted upright auxiliary lever operatively connected to the type bar at its upper end, a pivoted key lever having a rocking connection with the auxiliary lever 10 acting to vibrate the said lever with an accelerated motion, and an arm on one of the levers bearing against the other lever to limit the rebound of the type bar when it returns to its normal position.

34. In a typewriting machine, a type bar 15 arranged to swing upwardly and rearwardly, a horizontal-key lever pivotally supported at its rear end, and having a pendant arm adjacent the pivot, and an auxiliary lever pivotally supported at its 20 lower end having two arms, one of said arms forming a point of contact with the front of the pendant arm, the other arm of the auxiliary lever forming a rocking contact 25 with the rear of the pendant arm and extending upwardly in operative connection with the type bar.

35. In a typewriting machine, a series of 30 type bars arranged to swing upwardly and rearwardly, of a series of upright pivotally supported auxiliary levers of graduated lengths operatively connected to the type bars, and a series of pivotally supported 35 key levers of different lengths having up-

auxiliary levers, the rocking parts being of different form to equalize the travel of the upper ends of the auxiliary levers.

36. In a typewriting machine, a series of 40 type bars arranged to swing upwardly and rearwardly, a series of upright pivotally supported auxiliary levers of graduated lengths operatively connected to the type bars, and a series of pivotally supported 45 key levers of different lengths having up-right parts in rocking contact with the auxiliary levers, the rocking parts acting to move the auxiliary levers with an accelerated motion, and being of different form to equalize the travel of the upper ends of 50 the auxiliary levers.

37. In a typewriting machine, a hanger and a type bar action comprising a type bar, key lever and auxiliary lever all operatively connected, said key lever and auxiliary lever being fulcrumed on said hanger. 55

38. In a typewriter, the combination of a pivotally mounted type bar, a sub-lever connected with the type-bar, a key operated lever adapted to engage the sub-lever at 60 successive points as it is operated, and a spring connecting the sub-lever and key operated lever.

In testimony whereof I affix my signature in presence of two witnesses.

JAMES DENNY DAUGHERTY.

Witnesses:

ISAAC MILLER,
JAMES H. MCCAIN.