

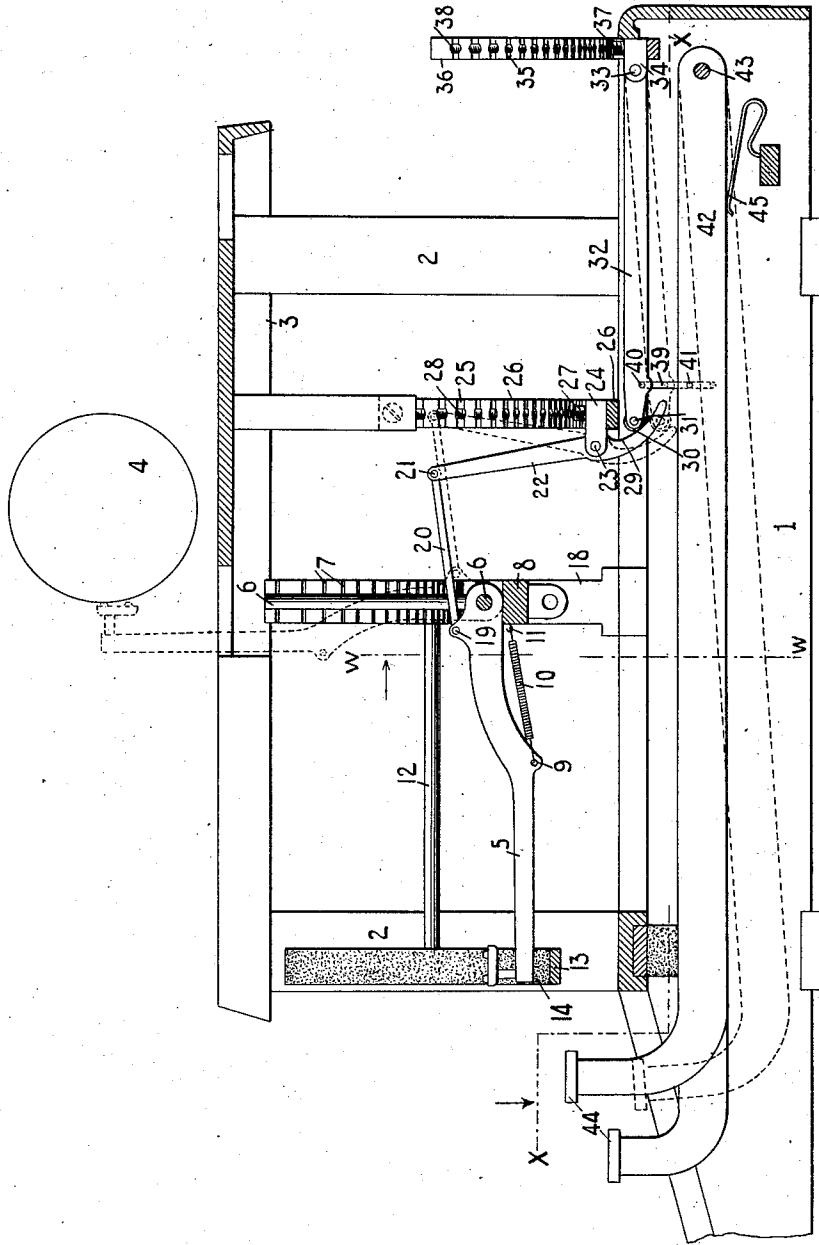
1,021,513.

J. FELBEL.
TYPE WRITING MACHINE.
APPLICATION FILED JULY 28, 1911.

Patented Mar. 26, 1912.

6 SHEETS-SHEET 1.

FIG. 1.



WITNESSES:

INVENTOR.

M. Hannover
Charles Smith

Jacob Felbel

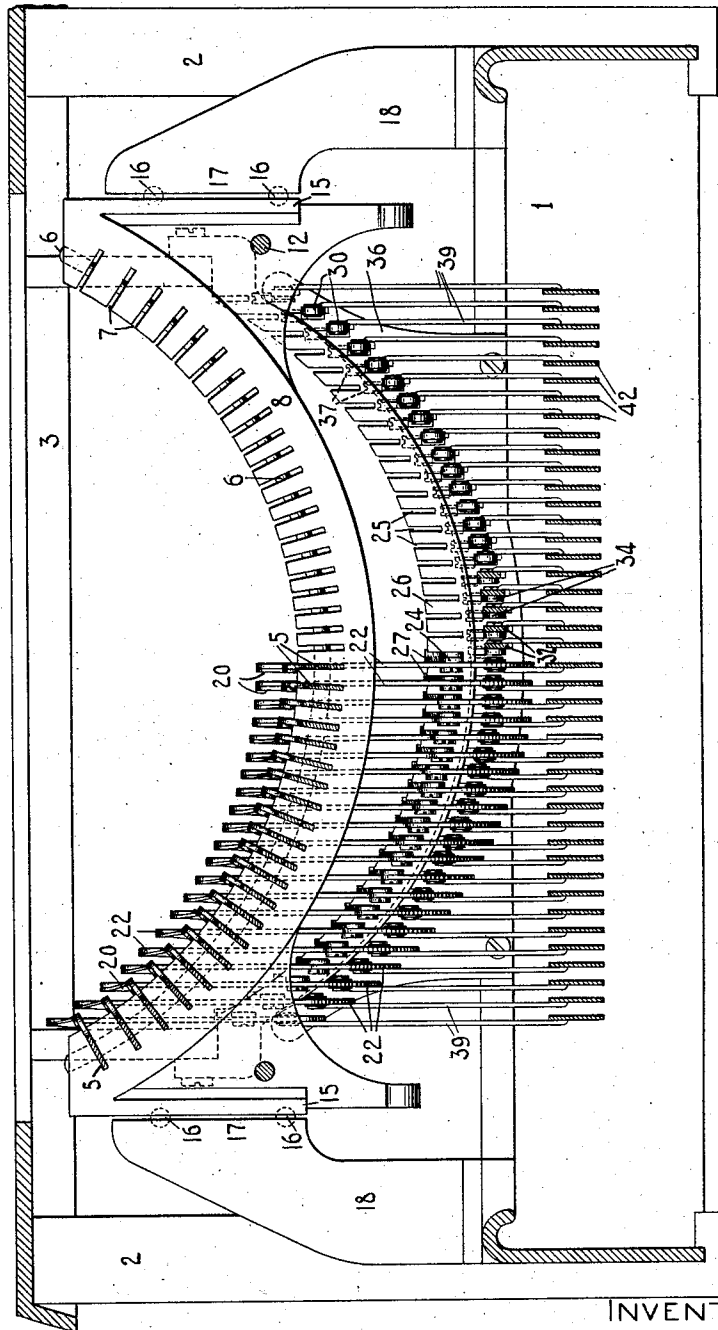
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6 SHEETS-SHEET 2.

FIG. 2.



WITNESSES.

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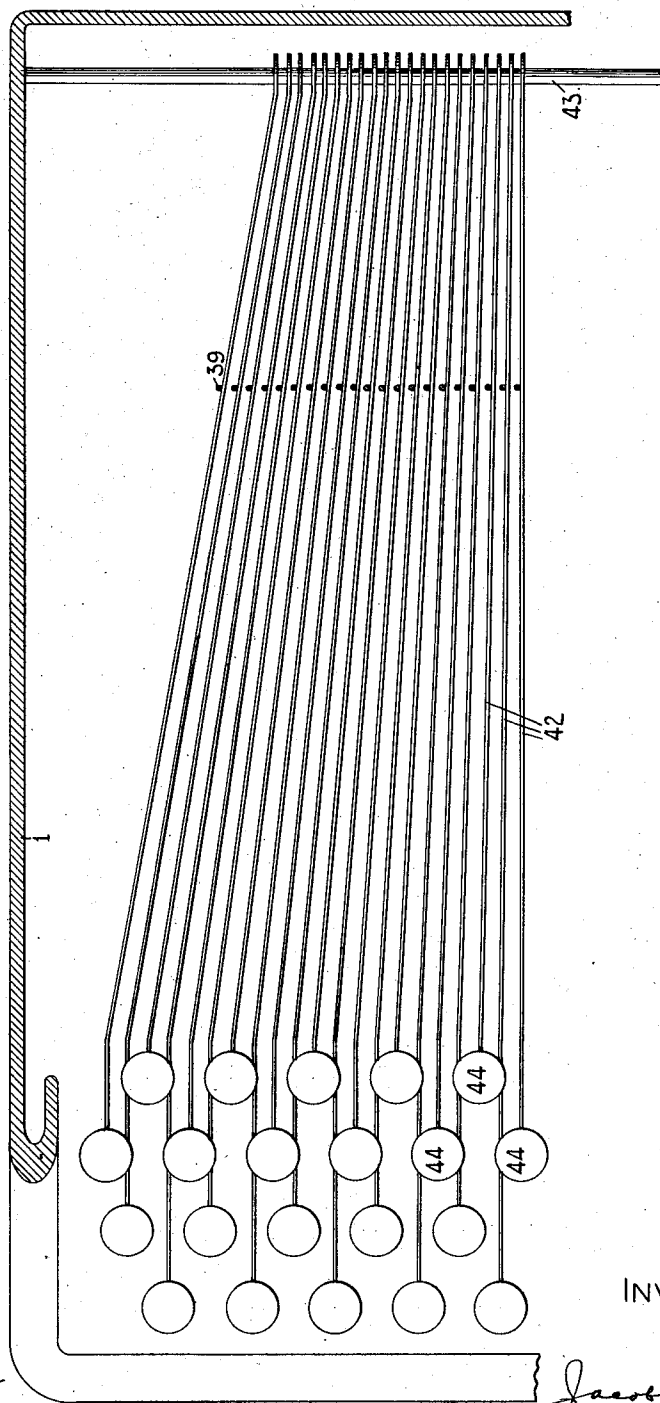
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6 SHEETS—SHEET 3.

FIG. 3.



WITNESSES.

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6 SHEETS-SHEET 4.

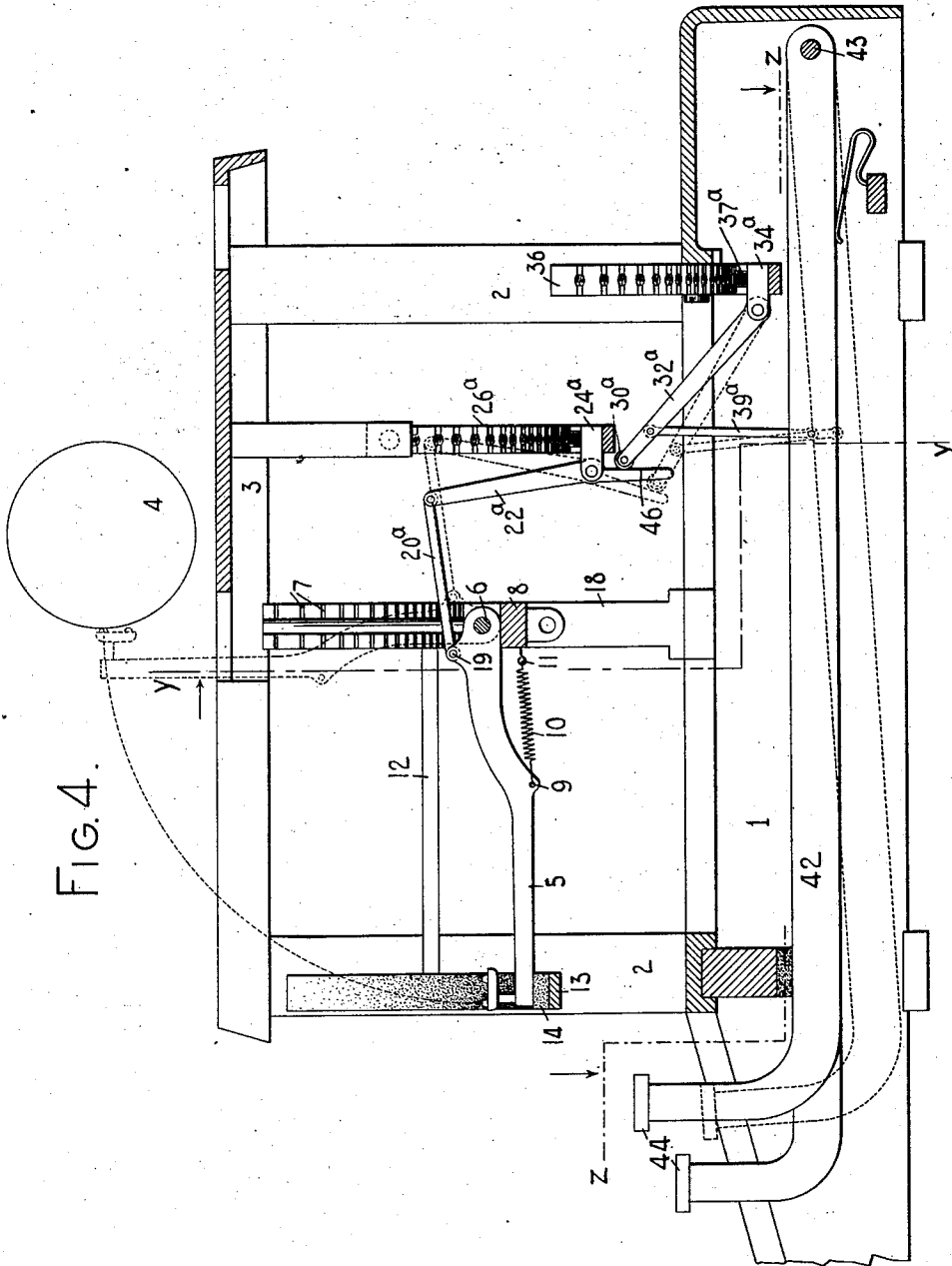


FIG. 4.

WITNESSES:

M. Hannicher

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INVENTOR.

Jacob Felbel

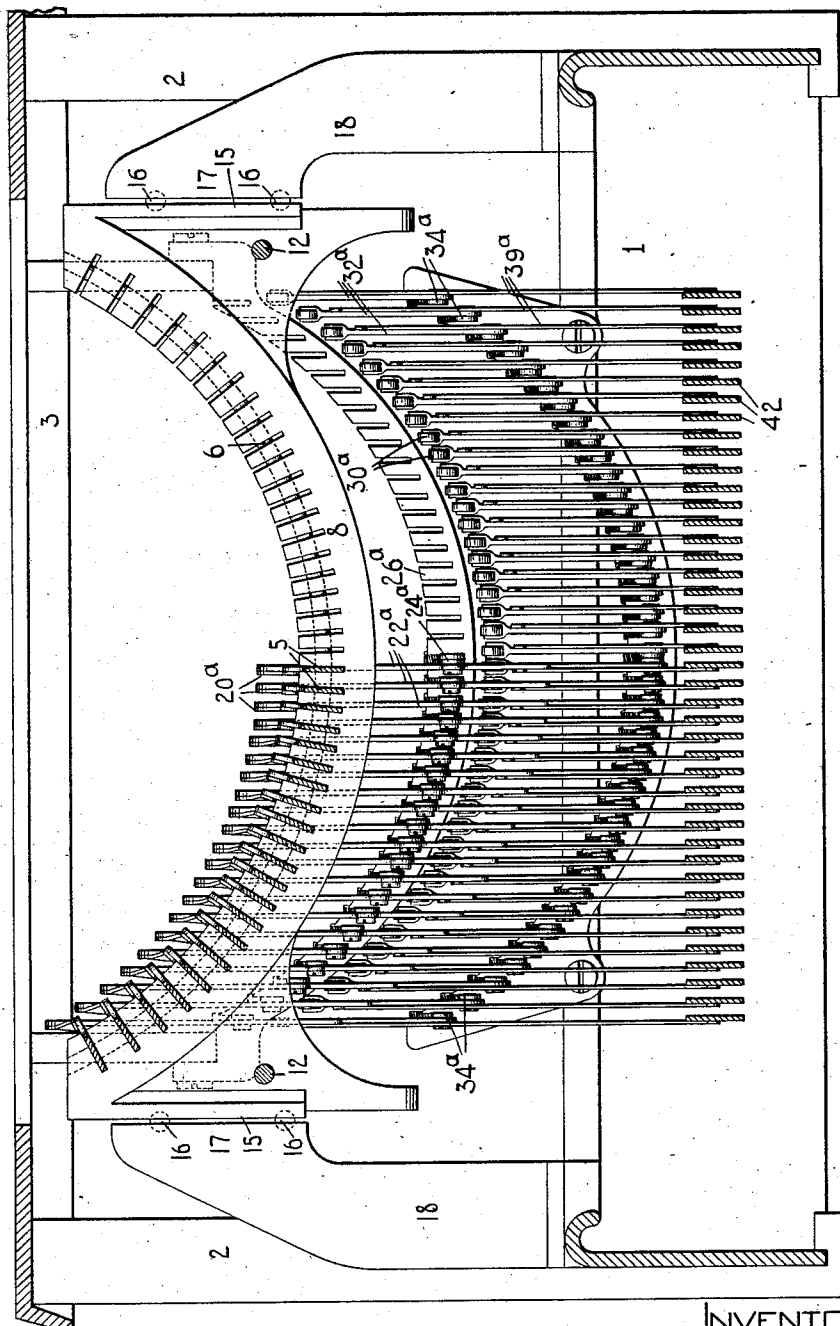
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6 SHEETS—SHEET 5.

FIG. 5.



WITNESSES:

M. Hannover
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INVENTOR:

J. Felbel

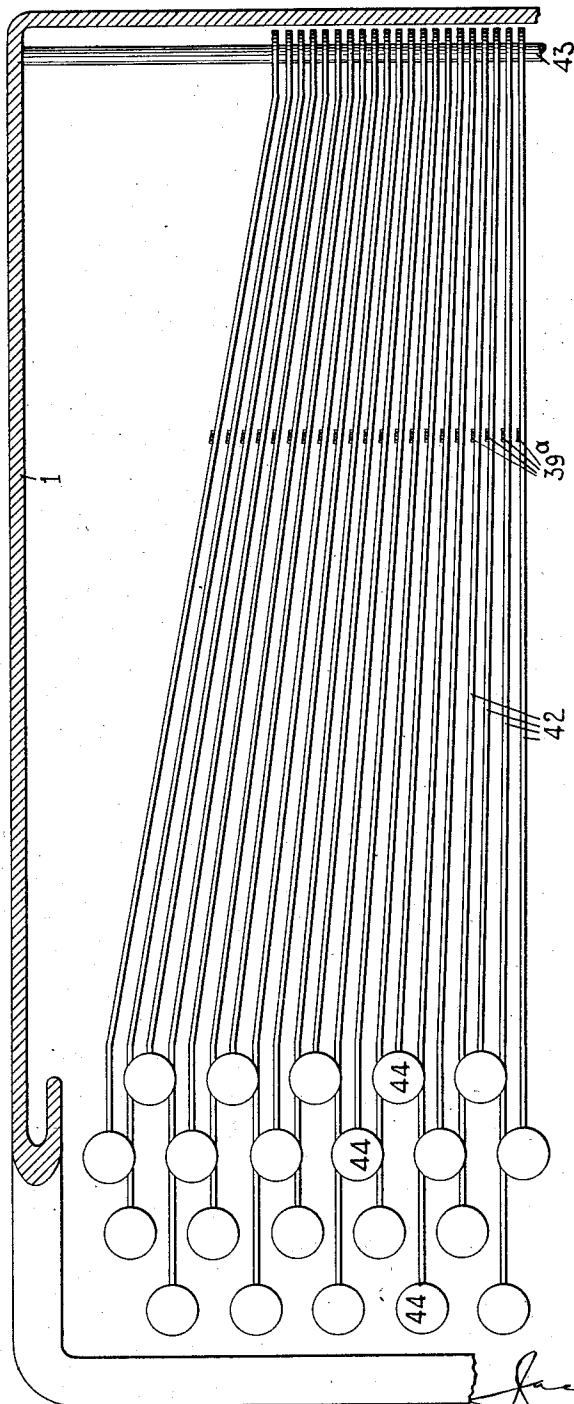
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Patented Mar. 26, 1912.

6 SHEETS-SHEET 6.

FIG. 6.



WITNESSES=

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UNITED STATES PATENT OFFICE.

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TYPE-WRITING MACHINE.

1,021,513.

Specification of Letters Patent.

Patented Mar. 26, 1912.

Application filed July 28, 1911. Serial No. 641,111.

To all whom it may concern:

Be it known that I, JACOB FELBEL, citizen of the United States, and resident of the borough of Manhattan, city of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Type-Writing Machines, of which the following is a specification.

My invention relates to typewriting machines and more particularly to type actions.

The main object of the invention, generally stated, is to provide an efficient type action for a "visible" or front-strike machine and one in which lateral or side strain is avoided and a uniform or substantially uniform leverage and dip of the keys is provided throughout the system.

To the above and other ends which will hereinafter appear, my invention consists in the features of construction, arrangements of parts and combinations of devices to be set forth in the following description and particularly pointed out in the appended claims.

In the accompanying drawings wherein like reference characters indicate corresponding parts in the various views, Figure 1 is a fragmentary vertical central, fore and aft sectional view of one form of typewriting machine embodying my invention; only so much of the machine being shown as is necessary to illustrate my invention.

Fig. 2 is a vertical, transverse, sectional view of the same taken on the line $w-w$ of Fig. 1 and looking in the direction of the arrow at said line. Fig. 3 is a fragmentary, horizontal, sectional view of the same taken on the line $x-x$ of Fig. 1 and looking in the direction of the arrow at said line. Fig. 4 is a view corresponding to Fig. 1 but showing a modified form of construction. Fig. 5 is a transverse, vertical, sectional view of the same taken on the line $y-y$ of Fig. 4 and looking in the direction of the arrow at said line. Fig. 6 is a fragmentary, horizontal, sectional view of the parts represented in Fig. 4; the section being taken on the line $z-z$ of Fig. 4 and looking in the direction of the arrow at said line.

Referring first more particularly to Figs. 1, 2 and 3 of the drawings, the frame of the

machine comprises a base 1, corner posts 2 and a top plate 3. A platen 4, diagrammatically represented in the present instance, is mounted in a carriage and supported in the usual manner for movement across the top plate from side to side of the machine. A segmentally arranged series of type bars 5 are pivoted at 6 to move upwardly and rearwardly and strike against the front face of the platen 4. The type bars may be mounted in any suitable manner but in the present instance are shown received in guide slots 7 in a vertically disposed type bar segment 8, and are mounted to turn on the pivot wire 6. Each type bar is connected as at 9 to one end of a contractile returning spring 10, the opposite end of which is connected at 11 to the type bar segment. Supporting rods 12 extend forwardly from the type bar segment and support a segmental strip 13 on which a type bar rest or pad 14 is mounted. The type bar segment in the present instance is mounted for vertical case-shift movement and is preferably provided with grooved guide ways in its sides 15 for the reception of anti-friction balls or rollers 16, which are likewise received in corresponding grooved guides 17 provided in upwardly extending bracket arms 18, secured to the frame of the machine. The type bar segment is thus mounted for vertical case shifting movement under control of a suitable key or keys not shown. To each type bar is pivoted at 19 a rearwardly extending pull link 20 which in turn is pivoted at its rear end, as at 21, to the upper end of an upstanding sub-lever 22 of the first order. Each sub-lever 22 is pivoted at 23 to a hanger 24 arranged in a slot 25 in a segment 26. A screw 27 is coöperative with each hanger to hold it in place; each screw entering a tapped opening 28 in the side walls of a slot 25 in which a hanger is mounted. The various slots 25 are vertically disposed, are in parallel arrangement and are segmentally arranged, as indicated in Fig. 2, so as to provide for a corresponding arrangement of the sub-levers 22 at the pivots and at the upper and lower ends thereof; it being understood that the sub-levers are of uniform size or length. From an inspection of Fig. 2 it will be observed that the upper ends of the sub-levers 22 are arranged in an arc which corresponds sub-

stantially to the arc in which the segmentally arranged type bars are disposed, so that a direct fore and aft movement may be transmitted from each sub-lever 22 to the associated type bar 5, through the intermediate pull link 20. The lower arm of each sub-lever 22 is preferably slightly inclined rearwardly to provide an inclined face 29 for coöperation with an anti-friction roller 30 mounted on a pivot pin 31, at the inner end of a substantially horizontally disposed sub-lever 32 of the third order; the sub-lever 32 being pivoted at 33 on one side of a hanger arm 34. Each of the hangers 34 is mounted in a vertically disposed slot 35 in a segment 36, which latter is secured to the base of the machine in any suitable way. A screw 37 is provided for each hanger, each of said screws being received in an opening 38 tapped in the side walls of each slot 35. The sub-levers 32 are parallel, segmentally arranged, and are of a uniform size or length. The width of the series of sub-levers 32 is substantially the same as the width of the series of sub-levers 22 and the series of type bars 5 and the upwardly opening arcs in which the type bars and the two series of sub-levers are pivoted are in parallel arrangement. A depending pull link 39 is pivoted at 40 to each sub-lever 32 and is likewise pivoted at 41, to a key lever 42 of the second order, which is substantially parallel with the associated sub-lever. The key levers have a fanning arrangement and they are all pivoted on a pivot rod or wire 43 supported in the base of the machine. The key levers extend forwardly beneath the sub-levers and are provided with the usual finger keys 44 and with returning springs 45.

From the foregoing description it will be understood that each of the series of substantially, horizontally disposed sub-levers 32 directly coöperates with the associated sub-lever 22, in the sense that there are no intermediate actuating connections such as sub-levers or links between the two co-acting sub-levers, although an antifriction roller is preferably employed to reduce the frictional engagement between the co-acting sub-levers. Moreover, it will be understood that the pivotal centers of the sub-levers 22 and 32 of both series are arranged in arcs; that both series of sub-levers are arranged in the rear of the type bars; and that each sub-lever of one series is arranged at an angle to its coöperative sub-lever of the other series; that one of the two coöperative sub-levers has an inclined portion with which the other sub-lever co-acts during the depression of a finger key to effect an operation of the type bar. It will also be seen from an inspection of Fig. 2 that the sub-levers 22 and 32 are both arranged at gradually increasing elevations from the center to

the sides of the system, and that the pull links 39 are of gradually increasing lengths from the center to the sides of the system to compensate for the variation in elevation of the sub-levers 32 with which the links 39 are connected. It will be understood that the leverage and extent of dip of the keys throughout the system is uniform, except for the slight variation that may be provided by reason of the different lengths of key levers.

From an inspection of Fig. 3 it will be seen that the key levers 42 are fanned or inclined rearwardly and inwardly from the sides of the system; and that the vertically disposed links 39 are directed downwardly in straight lines from the sub-levers 32 to which they are connected to the key levers 42 to which they make connection at the inclined portions of the key levers. By reason of this construction a direct downward pull on each link 39 is transmitted to the associated sub-lever 32 which receives an up and down movement, and that this movement is transmitted in the same plane with the associated sub-lever 22 which, however, receives its vibratory movement fore and aft of the machine to transmit movement to the type bar. A single vertical fore and aft plane therefor will cut or substantially cut, the point of connection 41 between the key lever and its link and between the other actuating connections intermediate this point of connection and the point 19 where connection is made with the type bar so that there is no side strain or pull on the parts but they move easily and effectively during the depression of a finger key. In other words, each individual type bar action from type to key lies in or substantially in a vertical plane considered lengthwise of the machine. Moreover, the construction is such as to afford a vertical case shift movement of the type bar segment without affecting the operativeness of the actuating connections.

In Figs. 4, 5 and 6 I have shown a modified form of construction which will be readily understood from the foregoing description of the construction illustrated in Figs. 1, 2 and 3. In the modified form of construction I have employed the same reference numerals to designate parts which correspond to those embodied in the previously described construction with the addition thereto of the exponent "a" although parts which are identical in the two constructions bear the same reference numerals. It will be seen that in the modification the sub-levers 32^a are more inclined than they are in the previously described form of the construction, and coöperate with a straight face 46 on a coöperative sub-lever 22^a, although in the normal disposition of the parts one of the coöperative sub-levers is arranged at an angle to the other, as in the

previously described construction to afford a camming action of one sub-lever on the other. Otherwise the parts are constructed and arranged substantially the same as in Figs. 1, 2 and 3.

Various changes may be made without departing from the spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent, is:—

1. In a front-strike typewriting machine, the combination of a series of segmentally arranged upwardly and rearwardly striking type bars; a series of key levers having portions thereof that are inclined toward the center of the machine; and intermediate actuating connections between said key levers and type bars, said connections comprising a series of substantially parallel sub-levers of the third order and a series of substantially parallel sub-levers of the first order, the sub-levers of one series being arranged at an inclination to the sub-levers of the other series, and the sub-levers of one series co-acting directly with the sub-levers of the other series, means for operatively connecting the sub-levers of one series with the type bars, and means for operatively connecting the sub-levers of the other series with the key levers.

2. In a front-strike typewriting machine, the combination of a series of segmentally arranged upwardly and rearwardly striking type bars; key levers; and intermediate actuating connections between said key levers and type bars, said connections comprising a series of substantially parallel sub-levers of the third order and a series of substantially parallel sub-levers of the first order, the sub-levers of one series being arranged relatively to the sub-levers of the other series to present inclined contact faces on the levers of one series for the direct camming action thereon of the sub-levers of the other series, one of said series of sub-levers having upstanding arms the upper ends of which are arranged in an arc and are connected with the type bars.

3. In a front-strike typewriting machine, the combination of a series of segmentally arranged upwardly and rearwardly striking type bars; key levers; and intermediate actuating connections between said key levers and type bars, said connections comprising a series of sub-levers of uniform size and the pivotal centers of which are arranged in an arc, a second series of sub-levers of uniform size co-acting directly with said first mentioned series of sub-levers, the second series of sub-levers having their pivotal centers arranged in an arc, connections between one series of sub-levers and the type bars, and connections between the other series of sub-levers and the key levers.

4. In a front-strike typewriting machine,

the combination of a series of segmentally arranged upwardly and rearwardly striking type bars; key levers; and intermediate actuating connections between said key levers and type bars, said connections comprising a series of sub-levers having upstanding arms arranged in an arc at the upper ends thereof, the sub-levers also having their pivotal centers arranged in an arc, connections between said sub-levers and type bars, a second series of sub-levers co-acting directly with the sub-levers of the first mentioned series and having their pivotal centers arranged in an arc, and connections between said key levers and the sub-levers of the second series.

5. In a front-strike typewriting machine, the combination of a series of segmentally arranged upwardly and rearwardly striking type bars; key levers; and intermediate actuating connections between said key levers and type bars, said connections comprising a series of sub-levers of a uniform size having upstanding arms arranged in an arc at the upper ends thereof, said arc being substantially co-extensive with the arc in which the type bars are arranged, the sub-levers also having their pivotal centers arranged in an arc, connections between said sub-levers and type bars, a second series of sub-levers of uniform size co-acting directly with the sub-levers of the first mentioned series and having their pivotal centers arranged in an arc, and connections between said key levers and the sub-levers of the second series.

6. In a front-strike typewriting machine, the combination of a series of segmentally arranged upwardly and rearwardly striking type bars; key levers; and actuating connections between said key levers and type bars, said connections comprising a series of parallel sub-levers of uniform size pivoted in an arc and having upright arms, links connecting said sub-levers and the type bars, a second series of parallel sub-levers of a uniform size pivoted in an arc, the sub-levers of one series co-acting directly with the sub-levers of the other series, and connections between the second series of sub-levers and the key levers.

7. In a front-strike typewriting machine, the combination of a series of segmentally arranged upwardly and rearwardly striking type bars; key levers; and actuating connections between said key levers and type bars, said connections comprising a series of parallel sub-levers of the first order, said sub-levers being of uniform size pivoted in an arc and having upright arms, means for connecting said sub-levers and the type bars, a second series of parallel sub-levers of the third order, said last mentioned sub-levers being of a uniform size and pivoted in an arc, the sub-levers of one series co-acting

directly with the sub-levers of the other series, and means for connecting the second series of sub-levers and the key levers.

8. In a front-strike typewriting machine, the combination of a series of segmentally arranged upwardly and rearwardly striking type bars; key levers; and actuating connections between said key levers and type bars, said connections comprising a series of sub-levers each mounted to vibrate at opposite ends thereof fore and aft of the machine, a second set of sub-levers each mounted to vibrate up and down throughout the lengths thereof and to co-act directly with one of said first mentioned sub-levers by a camming action, means for connecting one series of sub-levers with the key levers, and means for connecting the other series of sub-levers with the type bars.

9. In a front-strike typewriting machine, the combination of a series of segmentally arranged upwardly and rearwardly striking type bars; key levers; and actuating connections between said key levers and type bars, said connections comprising a series of sub-levers of uniform size mounted to vibrate fore and aft of the machine, said sub-levers having upstanding arms the upper ends of which are arranged in an arc, a second set of sub-levers of uniform size mounted to vibrate up and down and to co-act directly with said first mentioned sub-levers, means for connecting one series of sub-levers with the key levers, and means for connecting the other series of sub-levers with the type bars.

10. In a front-strike typewriting machine, the combination of a series of segmentally arranged upwardly and rearwardly striking type bars; key levers; and actuating connections between said key levers and type bars, said connections comprising a series of sub-levers pivoted in an arc to vibrate fore and aft of the machine, a second set of sub-levers pivoted in an arc to vibrate up and down and to co-act directly with said first mentioned sub-levers, means for connecting one series of sub-levers with the key levers, and means for connecting the other series of sub-levers with the type bars.

11. In a front-strike typewriting machine, the combination of a series of segmentally arranged upwardly and rearwardly striking type bars; key levers; and actuating connections between said key levers and type bars, said connections comprising a series of parallel sub-levers of uniform size pivoted in an arc to vibrate fore and aft of the machine, said sub-levers having upstanding arms the upper ends of which are arranged in an arc, a second series of parallel sub-levers of uniform size pivoted in an arc to vibrate up and down and to co-act directly with said first mentioned sub-levers, links connecting one series of sub-levers with the

key levers, and means for connecting the other series of sub-levers with the type bars.

12. In a front-strike typewriting machine, the combination of a series of segmentally arranged upwardly and rearwardly striking type bars; key levers; and actuating connections between said key levers and type bars, said connections comprising a series of sub-levers mounted to vibrate fore and aft of the machine, a second series of sub-levers mounted to vibrate up and down and to co-act directly with said first mentioned sub-levers, links connecting one series of sub-levers with the key levers, and substantially horizontally disposed links connecting the other series of sub-levers with the type bars.

13. In a front-strike typewriting machine, the combination of a series of segmentally arranged upwardly and rearwardly striking type bars; key levers; and actuating connections between said key levers and type bars, said connections comprising a series of sub-levers of uniform size pivoted in the rear of the type bars to vibrate fore and aft of the machine and having upright arms that terminate in an arc substantially co-extensive with the arc in which the segmentally arranged type bars are mounted, a second series of sub-levers which vibrate up and down and co-act directly with said first mentioned series of sub-levers, means for connecting one series of sub-levers with the type bars, and means for connecting the other series of sub-levers with the key levers.

14. In a front-strike typewriting machine, the combination of a series of segmentally arranged upwardly and rearwardly striking type bars; key levers; and actuating connections between said key levers and type bars, said connections comprising a series of parallel sub-levers of uniform size pivoted in an arc in the rear of the type bars to vibrate fore and aft of the machine and having upright arms that terminate in an arc substantially co-extensive with the arc in which the segmentally arranged type bars are mounted, a second series of parallel sub-levers of uniform size which extend longitudinally fore and aft of the machine and which sub-levers are pivoted in an arc to vibrate up and down and co-act directly with said first mentioned series of sub-levers, means for connecting one series of sub-levers with the type bars, and means for connecting the other series of sub-levers with the key levers.

15. In a front-strike typewriting machine, the combination of a series of segmentally arranged upwardly and rearwardly striking type bars; key levers; and actuating connections between said key levers and type bars, said connections comprising a series of sub-levers of the first order pivoted in the rear of the type bars to vibrate fore and aft of the machine and having upright arms

that terminate in an arc substantially co-extensive with the arc in which the segmentally arranged type bars are mounted, a second series of sub-levers of the third order which vibrate up and down and co-act directly with said first mentioned series of sub-levers, means for connecting one series of sub-levers with the type bars, and means for connecting the other series of sub-levers with the key levers.

16. In a front-strike typewriting machine, the combination of a series of segmentally arranged upwardly and rearwardly striking type bars; key levers; and actuating connections between said key levers and type bars, said connections comprising a series of parallel sub-levers of the first order pivoted in an arc in the rear of the type bars to vibrate fore and aft of the machine and having upright arms that terminate in an arc substantially co-extensive with the arc

in which the segmentally arranged type bars are mounted, a second series of parallel sub-levers of the third order and of uniform size which extend longitudinally fore and aft of the machine substantially parallel with the key levers and which sub-levers are pivoted in an arc to vibrate up and down and co-act directly with said first mentioned series of sub-levers, links connecting one series of sub-levers with the type bars, and links connecting the other series of sub-levers with the key levers.

Signed in the borough of Manhattan, city of New York, in the county of New York, and State of New York, this 27th day of July, A. D. 1911.

JACOB FELBEL.

Witnesses:

M. HANNWEBER,
CHARLES E. SMITH.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."