No. 835,575. PATENTED NOV. 13, 1906.

R. H. STROTHER.

TYPE WRITING MACHINE.

APPLICATION FILED AUG. 19, 1904.

3 SHEETS—SHEET 1.

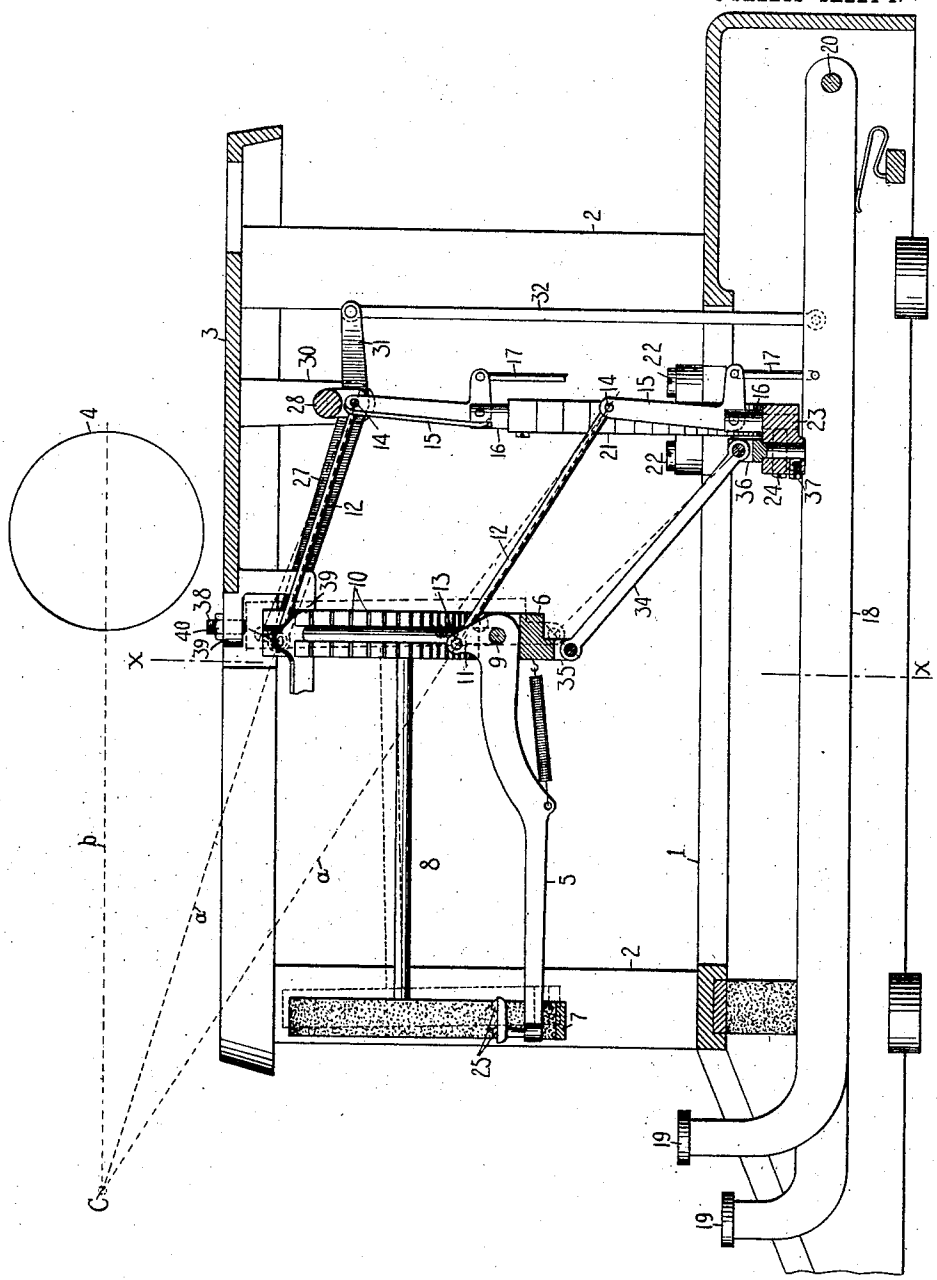

FIG. 1.

WITNESSES.

E. M. Wells.

M. W. Pool

INVENTOR.

Robert H. Strother

By Jacob Felbel

HIS ATTORNEY

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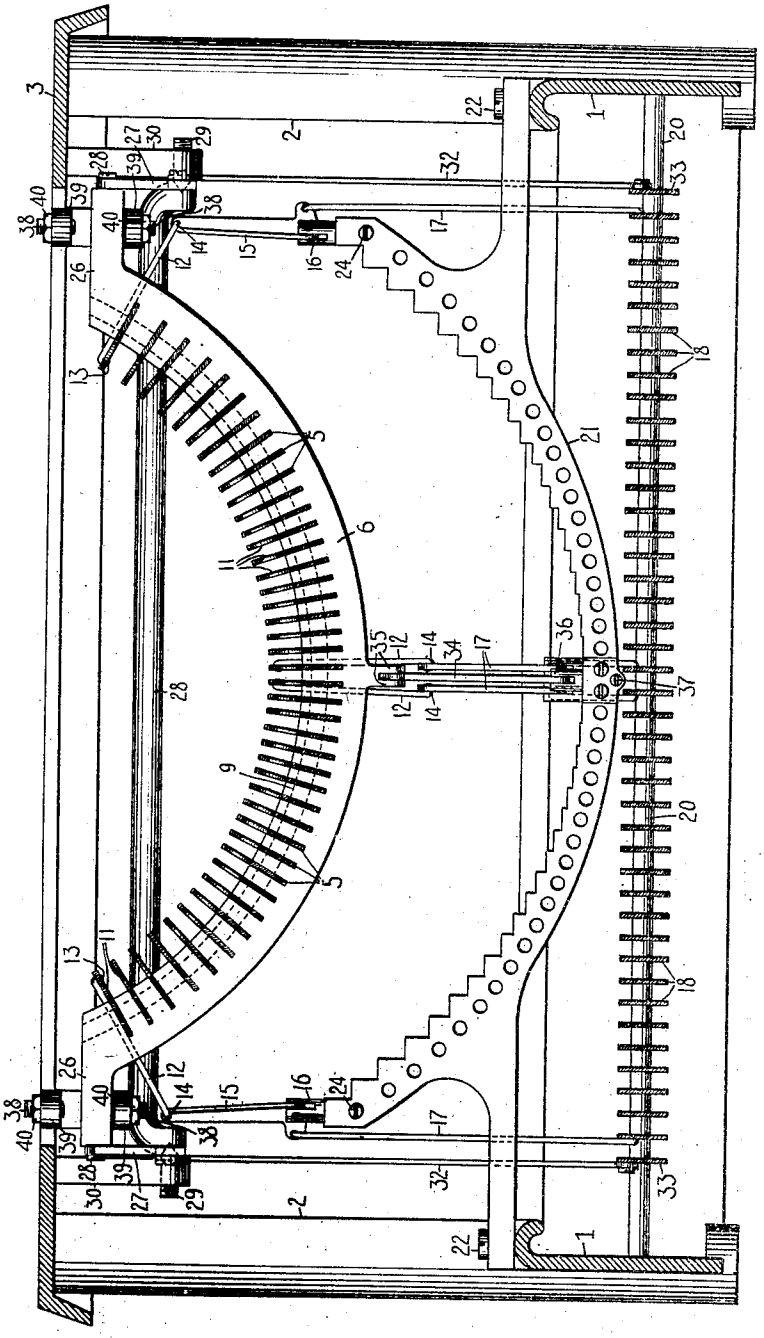

FIG. 2.

WITNESSES:

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INVENTOR:

Robert H. Strother,

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3 SHEETS—SHEET 3.

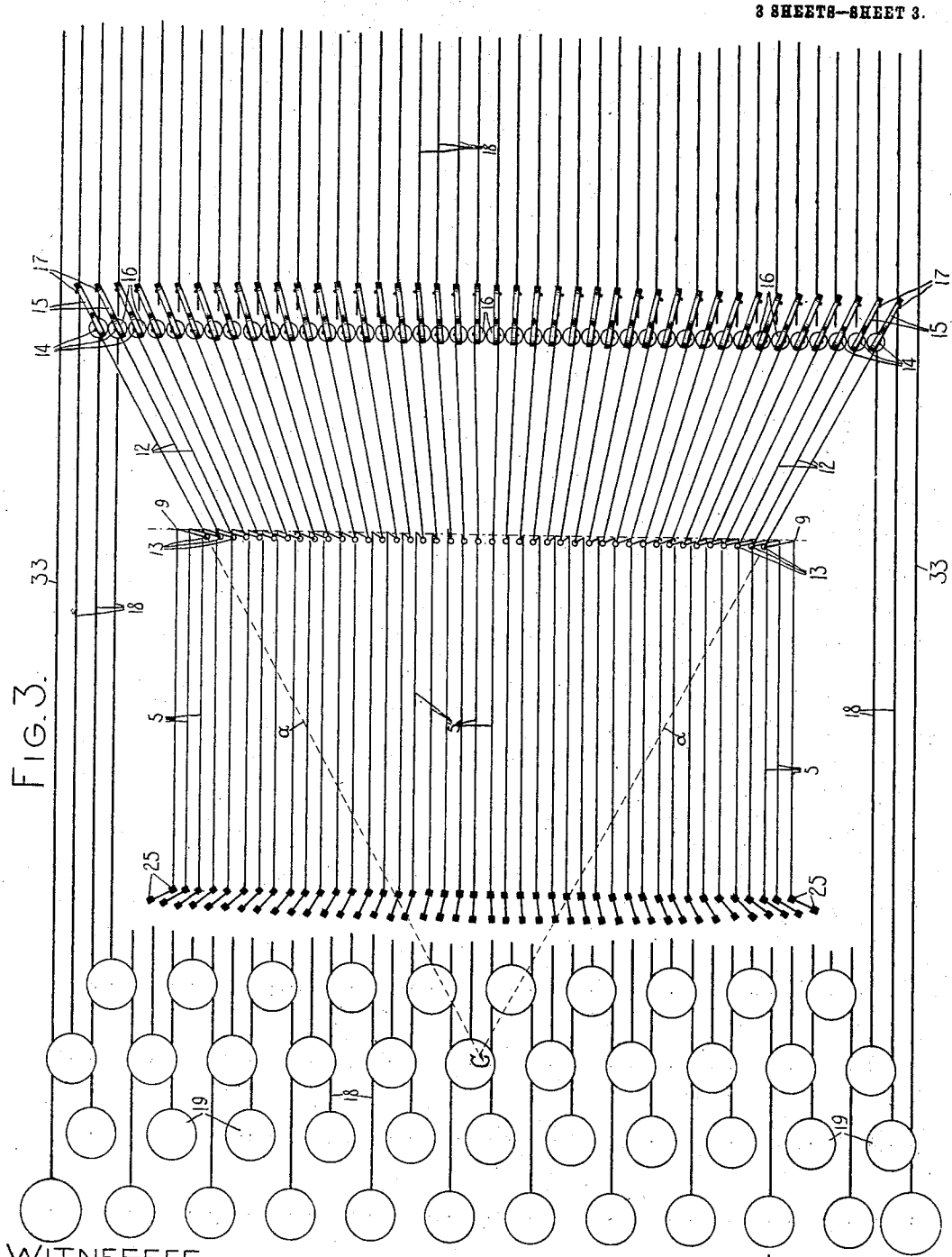

FIG. 3.

WITNESSES.

E. M. Wells.

M. W. Pool

INVENTOR.

Robert H. Strother

By Jacob Felbel

HIS ATTORNEY

UNITED STATES PATENT OFFICE.

ROBERT H. STROTHER, OF NEW YORK, N. Y., ASSIGNOR TO UNION TYPEWRITER COMPANY, OF JERSEY CITY, NEW JERSEY, A CORPORATION OF NEW JERSEY.

TYPE-WRITING MACHINE.

No. 835,575. Specification of Letters Patent Patented Nov. 13, 1906.

Application filed August 19, 1904. Serial No. 221,407.

To all whom it may concern:

Be it known that I, ROBERT H. STROTHER, a citizen of the United States, and a 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 type-writing machines, and more especially to the type-action of such machines.

My invention relates also to the case-shifting mechanism.

In type-writing machines, and more especially in front-strike type-writers, the type-bars are usually arranged in a segment of a circle and said type-bars are actuated by a system of key-levers. The width which it is desirable to give to the key-lever system is greater than that which it is desirable to give to the system of type-bars. Moreover, the key-levers usually move up and down in vertical planes, whereas the type-bars swing in planes at different inclinations to the vertical.

The principal object of my invention is to so connect a system of type-bars with a system of key-levers of greater width than said system of type-bars as that all of the parts shall be operated by direct pulls or pushes applied substantially in the planes in which the pivoted elements swing, and therefore without torsional strain.

One embodiment of my invention is illustrated in the accompanying drawings, in which—

Figure 1 is a front to rear vertical section of a type-writing machine. Fig. 2 is a transverse vertical section of the same, taken substantially on the line *x x* of Fig. 1 and looking toward the back of the machine; and Fig. 3 is a diagrammatical plan view showing the arrangement of the key-lever system, the type-bar system, and the system of connecting devices.

I have shown my invention applied to a front-strike type-writer the main frame of which comprises a base portion 1, from which rise posts 2, which support a top plate 3, on which is mounted a carriage having a platen 4. A series of type-bars 5 are pivotally mounted on a segment 6, and the free ends of said type-bars normally rest in a basket or segmental type-rest 7, which is supported by arms 8, connected with the type-bar segment.

The type-bars are mounted to swing upward and backward to cause the types to strike against the front face of the platen. The precise manner in which said type-bars are mounted on the segment is immaterial to my invention. As shown in the present case, said type-bars are pivoted on a pivot rod or wire 9, which lies in a slot in the segment 6, and each of said type-bars is guided by a transverse slot 10 in said segment. Each of the type-bars has an arm 11, to which an operating-link 12 is pivoted at 13.

In front-strike machines, the operating-links are connected to the type-bars, sometimes above and sometimes below the pivots of the latter, and said links extend toward the front of the machine in some instances, and in other instances they extend toward the back of the machine. Moreover, said links are sometimes pull-links and sometimes push-links. For the purpose of illustrating the principle of my invention I have deemed it sufficient to show it applied to one of these arrangements. In the machine shown in the drawings the links 12 are pull-links connected to the type-bars above the pivots of the latter, and they extend toward the back of the machine. Said link is pivoted at its other end at 14 to the upwardly-extending arm of a bell-crank sublever 15, which is pivotally mounted in a hanger 16 and which has a horizontally-extending arm which is connected by a link 17 with a key-lever 18. As shown in the present case, the key-levers consist of levers extending from the keyboard toward the back of the machine and having keys 19 on their front ends and pivoted at their rear ends on a stationary rod 20. So far as my invention is concerned, however, these key-levers might have other forms. For example, they might have the form of rock-shafts provided with arms, such as are used in the Smith Premier type-writer.

The hangers 16 are rigidly mounted on a fixed segment 21, which is secured by screws 22 to the base portion 1 of the main frame. Said segment 21 is stepped, as shown in Fig. 2, and said hangers are mounted one on each

step. To this end each of said hangers has a reduced portion 23, Fig. 1, which extends into a hole which opens on the upper surface of each step. The hangers are secured in position by set-screws 24, which are threaded into the segment and which engage said reduced portion 23 of the hangers. The segment 21 is of greater radius than the type-bar segment 6 and stands lower in the machine than said segment. The links 12 lie substantially along elements of the frustum of a cone, the axis of which passes through the center of the type-bar segment. In Figs. 1 and 3 the lines *a* represent two of the elements of said cone, the line *b* represents the axis of said cone, and the point C is the apex of the cone. The bell-crank sublevers 15 swing in vertical planes which intersect in a vertical line through the point C.

As will be understood by reference to Fig. 3, the parts are so designed that each of the links 17 is vertically disposed, its point of connection with the sublever 15 standing vertically over its key-lever. Each of the links 17 therefore lies in the plane in which its key-lever moves, and it also lies in the vertical plane in which its sublever swings. In other words, this link lies substantially along the line of intersection of the plane of the key-lever and the plane of the sublever. By an inspection of Fig. 3 it will be seen that each of the links 12 lies in the plane of its sublever, and by an inspection of Fig. 2 it will be seen that each of said links lies also in the plane of its type-bar—that is to say, in the plane in which the arm 11 of said type-bar swings. It will be perceived, therefore, that each of the links 12 lies substantially in the line of intersection of the plane of its sublever with the plane of its type-bar. The construction is such that the link 17 does not impose any side pull either on its key-lever or on its sublever and also that the link 12 does not impose any side pull either on its sublever or on its type-bar, so that the system is practically free from torsional strain, and each pivoted member of the system is affected only by forces applied in the plane in which said member swings.

For some of the purposes of my invention it is not necessary that the sublevers should be in the nature of bell-crank levers, but other operating devices might be substituted for said bell-cranks without departing from my invention.

I prefer to mount a plurality of types on each type-bar, and in the present case I have accordingly shown each type-bar equipped with two types 25. It is obvious that the platen may be shifted to cause one or the other of these types to print; but I prefer to shift the type-bar segment for this purpose. It will be obvious that if the case-shift motion of said segment consisted of a rectilinear vertical motion then such a motion would result in a pull on each of the links 12 and a partial operation of all of the type-bars. I have accordingly provided means whereby the case-shift motion of the segment is of such a nature that each of the links 12 rocks about the point 14 as a pivot, this being the point of connection between the link and the sublever. To this end the upper and outer ends of the segment 6 are formed with arms or brackets 26, which extend toward the sides of the machine, respectively, and which are pivotally connected with arms 27 by headed and shouldered screws 28, which pass through said arms and are threaded into the ends of the brackets 26. The common axis of these pivot-screws passes substantially through the points 13, at which the two end links 12 are pivoted to the end type-bars of the system. The arms 27 are rigidly mounted on or are formed integral with a rock-shaft 28, which is pivoted at its ends on cone pivot-screws 29, which are threaded through brackets 30, which depend from the top plate 3. In the present instance the axis of oscillation of the shaft 28 passes through the pivot-points 14 of the two links 12, which are at the ends of the series. In order to avoid interference of said rock-shaft with these links and their sublevers, the rock-shaft is bent, as shown in Figs. 1 and 2. An arm 31 projects from the rock-shaft 28 toward the back of the machine and is connected by a link 32, Fig. 1, with a case-shift-key lever 33, Fig. 2. In the present instance I have shown two case-shift-key levers—one on each side of the machine. The construction is such that if a case-shift key be depressed the shaft 28 will be rocked and the arms 27 will be elevated, thus raising the type-bar segment. The parts being constructed as described, it is obvious that each of the end links 12 of the series will swing about its point of connection with its sublever as a pivot. In order to guide the segment in such a manner that the remaining links will also operate in the same manner, a link 34 is pivoted at its forward end in ears 35, depending from the middle of the type-bar segment, and said link extends downward and backward and is pivoted at its rear end in a hanger 36, which is secured by a set-screw 37 to the segment 21 in a manner similar to that in which the hangers 16 are secured to said segment. This link guides the lower middle portion of the type-bar segment in such a manner that said segment swings in case-shifting, as indicated by dotted lines in Fig. 1, so that the lower links 12 move about their ends 14 as pivots. When the parts are swung in this manner, the intermediate links will also swing about their ends 14 as pivots, so that when the segment is shifted no pull will be imposed upon any of the links by such shifting motion.

The shifting motion of the type-bar segment is adjustably limited in both directions

by set-screws 38, which are threaded through brackets 39, which are secured to the top plate 3. Each of the screws 38 is provided with a lock-nut 40.

It is not essential for some of the purposes of my invention that all of the links 12 shall lie in the surface of a right cone; but some of the advantages of said invention are secured by arrangements of said links, which may be described in general terms as "conical" arrangements, but in which said links are not elements of a frustum of a right cone.

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

1. In a front-strike type-writing machine, the combination of a segmentally-arranged series of front-strike type-bars; a conically-arranged series of operating-links connected to said type-bars; a series of sublevers mounted to swing in non-parallel planes and connected to said links; and a series of vertically-movable key-levers connected with said sublevers.

2. In a front-strike type-writing machine, the combination of a segmentally-arranged series of front-strike type-bars; a segment on which said type-bars are pivotally mounted a conically-arranged series of links connected with said type-bars; a series of sublevers mounted to swing in converging vertical planes and connected with said links; and a series of key-levers connected with said series of sublevers.

3. In a front-strike type-writing machine, the combination of a series of key-levers; a segmentally-arranged series of front-strike type-bars; a conically-arranged series of links connected at one end with said type-bars; a series of bell-crank sublevers having upwardly-extending arms to which said links are connected at the other ends thereof and having horizontally-extending arms connected with said key-levers.

4. In a front-strike type-writing machine, the combination of a series of key-levers; a series of sublevers mounted to swing in converging vertical planes; said sublevers having horizontally-disposed arms which are connected with said key-levers and having also vertically-disposed arms; and a series of front-strike type-bars connected with said vertically-disposed arms.

5. In a front-strike type-writing machine, the combination of a platen; a segmentally-arranged series of front-strike type-bars, each carrying a plurality of types; a conically-arranged series of links connected with said type-bars; a series of keys connected with said links; and a case-shift mechanism arranged to shift said type-bars.

6. In a front-strike type-writing machine, the combination of a series of front-strike type-bars each carrying a plurality of types; a segment on which said type-bars are pivotally mounted; a series of sublevers mounted on a segment of greater radius than said type-bar segment; a series of links connecting said type-bars and sublevers; a series of keys connected with said sublevers; and means for imparting a case-shift motion to said type-bar segment.

7. In a type-writing machine, the combination of a series of type-bars each carrying a plurality of types; a segment on which said type-bars are pivotally mounted; a series of actuating devices for said type-bars; a conically-arranged series of links connecting said actuating devices with said type-bars; means for shifting said type-bar segment; and means for guiding the shifting motion of said segment so that each link turns about its point of connection with its actuating device as a center.

8. In a type-writing machine, the combination of a series of type-bars each carrying a plurality of types; a segment on which said type-bars are pivotally mounted; a series of key-levers, wider than said series of type-bars; a series of sublevers connected with said key-levers; a conically-arranged series of links connecting said sublevers with said key-levers; a rock-shaft having arms connected with the said segment near the ends thereof; a link for guiding the middle of said segment; and a case-shift key for shifting said segment.

9. In a type-writing machine, the combination of a segmentally-arranged series of type-bars pivoted to swing in planes at different inclinations to the vertical; a conically-arranged series of links connected with said type-bars; a series of sublevers connected with said links, each sublever having a horizontal pivot and swinging substantially in the vertical plane of its link; and a series of key-levers connected with said sublevers.

10. In a type-writing machine, the combination of a segmentally-arranged series of front-strike type-bars; a conically-arranged series of links connected to said type-bars, each link lying substantially in the plane of its type-bar; a segmentally-arranged series of sublevers, each having a horizontal pivot and swinging substantially in the vertical plane of its link; and a series of vertically-movable key-levers connected with said sublevers.

11. In a type-writing machine, the combination of a series of type-bars pivoted to swing in planes that intersect in a line; a series of sublevers pivoted to swing in planes that intersect in a line at right angles to the first-mentioned line; a conically-arranged series of links connecting said sublevers and said type-bars; and key-levers connected with said sublevers.

12. In a front-strike type-writing machine, the combination of a series of front-strike type-bars; a conically-arranged series of links connected with said type-bars; a se-

ries of sublevers connected with said links, each sublever pivoted to swing substantially in the vertical plane of its link; a series of key-levers; and a series of substantially vertical links connecting said key-levers to said sublevers.

13. In a type-writing machine, the combination of a series of type-bars; a segment on which said type-bars are mounted; a conically-arranged series of links connected to said type-bars; a series of operating devices connected to said links; means for imparting to said type-bar segment a case-shift motion in a direction across the axis of said segment; and means for guiding the motion of said segment so that the links turn about their points of connection with said operating devices as centers.

14. In a front-strike type-writing machine, the combination of a series of front-strike type-bars; a segment on which said type-bars are pivotally mounted; a conically-arranged series of links connected with said type-bars; a series of sublevers connected to said links; a rock-shaft having arms pivoted to said type-bar segment; a link connected to said type-bar segment and to a stationary part of the framework; and means for imparting a case-shift motion to said segment, said arms and link being so disposed as to guide the motion of said segment to cause each of said links to swing about its point of connection with its sublever as a center.

15. In a front-strike type-writing machine, the combination of a type-bar segment, a series of front-strike type-bars pivotally mounted on said segment, a series of bell-crank sublevers each pivoted to swing in a vertical plane and each having a vertical arm and a horizontal arm, links connecting the vertical arms of said sublevers with said type-bars, a series of key-levers, and links connecting said key-levers with the horizontal arms of said sublevers.

Signed at the borough of Manhattan, city of New York, in the county of New York and State of New York, this 18th day of August, A. D. 1904.

ROBERT H. STROTHER.

Witnesses:
CHARLES E. SMITH,
E. M. WELLS.