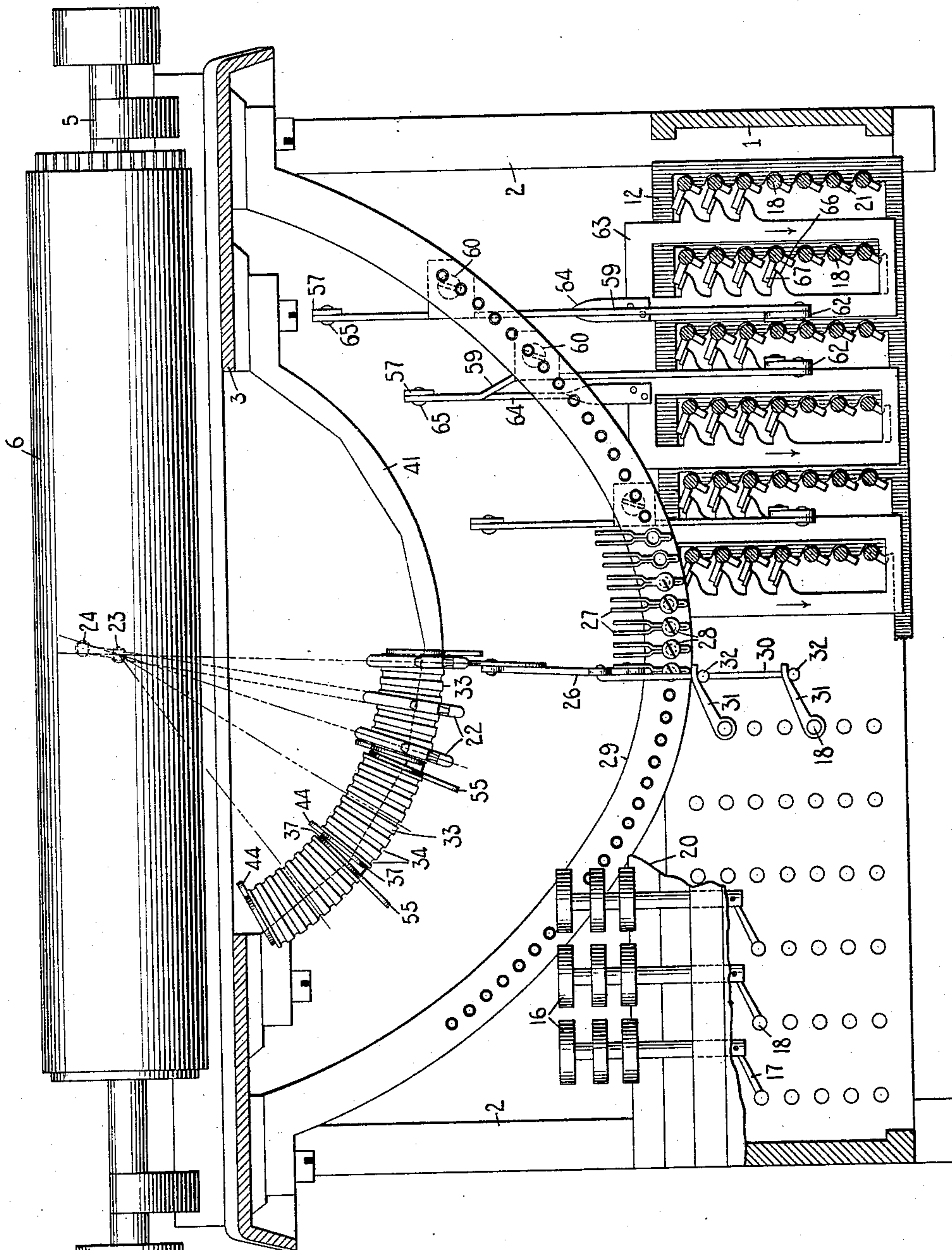


J. H. BARR.
TYPE WRITING MACHINE.
APPLICATION FILED JULY 22, 1904.

969,326.

Patented Sept. 6, 1910.

3 SHEETS—SHEET 1.



WITNESSES:

E. M. Wells.

R. H. Strother.

FIG. 1.

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John H. Barr

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3 SHEETS—SHEET 2.



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3 SHEETS—SHEET 3.

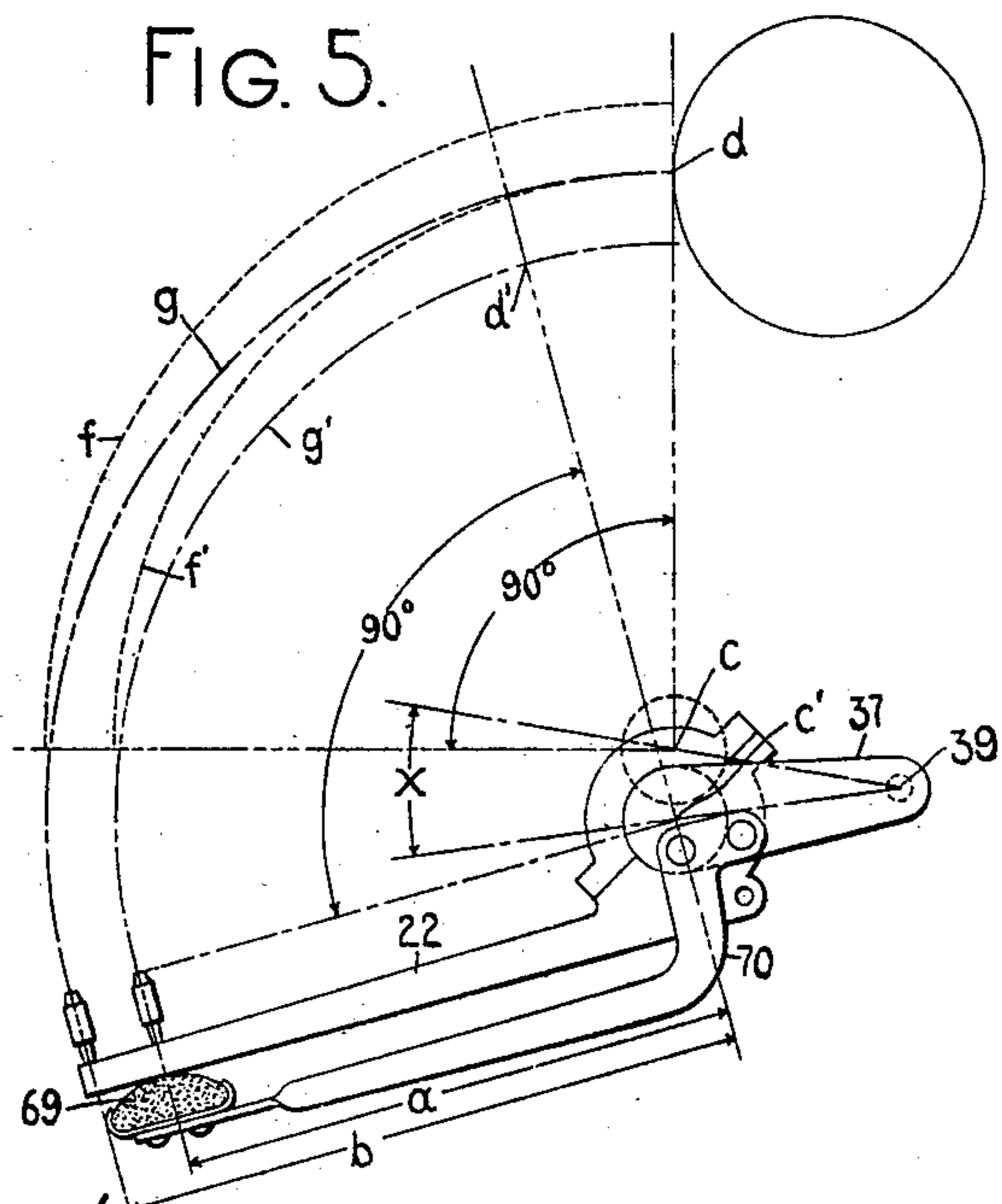
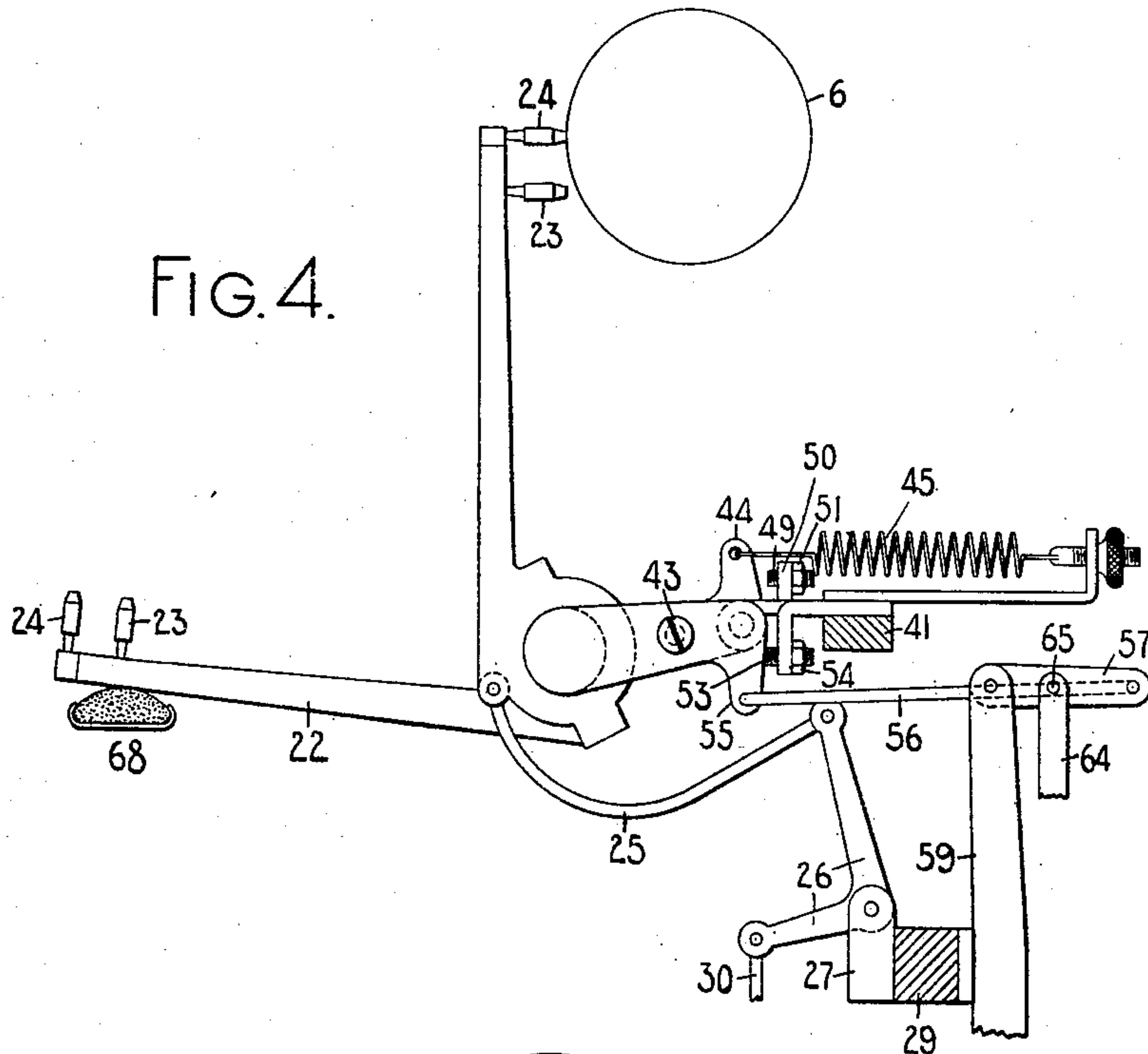
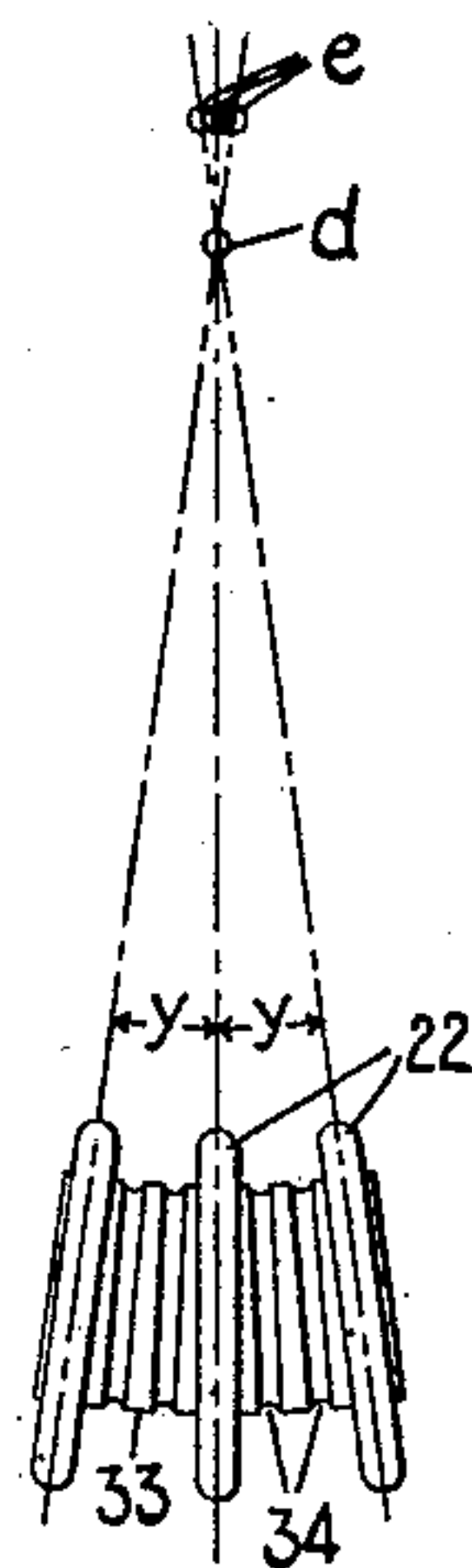


FIG. 6.



WITNESSES:

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UNITED STATES PATENT OFFICE.

JOHN H. BARR, OF SYRACUSE, NEW YORK, ASSIGNOR TO THE SMITH PREMIER TYPE-WRITER COMPANY, OF SYRACUSE, NEW YORK, A CORPORATION OF NEW YORK.

TYPE-WRITING MACHINE.

969,326.

Specification of Letters Patent.

Patented Sept. 6, 1910.

Application filed July 22, 1904. Serial No. 217,628.

To all whom it may concern:

Be it known that I, JOHN H. BARR, citizen of the United States, and resident of Syracuse, in the county of Onondaga 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 especially to means whereby a type carrier having a plurality of types mounted thereon may be so operated as to cause any one of such types to print. In the embodiment of my invention shown herein, such type carriers consist of a series of type bars arranged in a plurality of sets, each of which is independently shiftable. I have provided means whereby each type carrier is connected with a plurality of keys and certain of said keys effect the shifting motion automatically.

In the accompanying drawings, Figure 1 is a front elevation, partly in section, of a typewriting machine in which my invention is embodied; Fig. 2 is a vertical sectional view of said machine, the section being taken from front to rear of the machine; Fig. 3 is a distorted face view of one of the type bar segments and the bracket on which said segment is mounted; Fig. 4 is a detail view in front to rear vertical section; Fig. 5 is a diagrammatic view illustrating the motion of the type bar and its carrier as seen from one side; and Fig. 6 is a diagrammatic view illustrating the motion of a type bar as seen from the front.

I have shown my invention applied to a front-strike typewriter, 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 rail 4 having in its front and rear edges raceways which cooperate with corresponding raceways in a carriage 5, on which is mounted a platen 6. The carriage is drawn across the machine by the usual spring drum or by any suitable means, and its motion is controlled by an escapement wheel 7 with which cooperate feed dogs 8 mounted on the upper end of a vertical rock shaft 9, which has near its lower end an arm 10, which is operated by a bracket 11, which is mounted on a transversely reciprocating universal bar or gate 12, the construction of these parts being

substantially like that in the Smith Premier typewriter. The escapement wheel 7 is mounted on one end of a shaft, which at its other end carries a pinion 13, which meshes with a rack bar 14, which is supported on arms 15 which are pivoted to the carriage. The keys 16 are mounted on stems which are pivoted to arms 17 on rock shafts 18 which are held in their normal positions by springs 19. The rock shafts 18 are journaled at their forward ends in frame plates 20 and at their rear ends in the base portion 1 of the main frame, and said rock shafts are provided with arms 21 (Fig. 1) which operate the universal bar 12 in the manner usual in the Smith Premier typewriter. Each of the type bars 22 carries a plurality of types. In the present case I have shown a lower case type 23 and an upper case type 24 mounted on each type bar.

In the present instance I have shown a machine provided with forty-two type bars each carrying two types and actuated by eighty-four keys, one for each type, each type bar being operatively connected with two keys. Each type bar is operated by a push link 25, which is pivoted at its front end to the type bar and at its rear end to the vertical arm of a bell crank 26, which is pivoted to a hanger 27, which is secured, as by a screw 28, to a stationary segment 29, which lies back of the type bars. The bell crank 26 has a forwardly extending arm to which is connected a link 30, which extends loosely through slots in two arms 31, fixed on two of the rock shafts 18. The link 30 has formed thereon two enlargements or balls 32 which lie beneath the arms 31. The construction is such that if either of these two rock shafts be operated by its key, the link 30 will be drawn down by the engagement of the arm 31 of the operated rock shaft with one of the balls 32 and the link will move idly through the slot in the other arm 31 without disturbing the other rock shaft 18. It will thus be seen that the bell crank 26 may be operated by any one of a plurality of keys without disturbing any other key.

The upper one of the two rock shafts is connected with an upper case key and the lower one with a lower case key. When the latter key is operated the type bar is simply swung about its pivot and the lower

case type 23 strikes the platen, but when the upper case key is operated the type bar is swung about its pivot and at the same time a case shift motion is imparted to said pivot, and the upper case type 24 strikes the platen. In order to effect this case shift motion the series of type bars is divided into a plurality of sets, six sets being shown in the present case. The type bars are mounted on short segments 33, each of which consists of a section of a rod having ball races 34 formed in its surface, and the pivotal end of each type bar is formed with an eye 35 having an internal ball race formed therein to cooperate with one of the ball races 34. Anti-friction balls 36 run in these cooperating races. This particular form of ball bearing type bar and also the operating links for the type bars, the series of bell crank levers mounted on the stationary segment and operated by links each of which is connected to one of the rock shafts, are not of my invention.

The segments 33 are mounted on arms 37 which are secured to the ends of said segments by screws 38 (Fig. 2). The arms 37 extend from the segment 33 toward the rear of the machine and are pivoted on the conical ends of a rod 39 (Fig. 3) which is secured to a bracket 40 which is secured to a stationary segment 41 by screws (Fig. 2) which pass through openings (Fig. 3) in the brackets 40. The brackets 40 are formed of sheet metal, and the segment 41 is formed on its upper surface with flat faces for the reception of said brackets, as shown in Fig. 1. The pivotal bearings of the arm 37 are adjustable by tightening or loosening a nut 42 (Fig. 3) threaded on the end of a headed bolt 43 which connects the two arms 37, said arms being bent toward one another, as shown in Fig. 3, to accommodate the head of the bolt and the nut without having these parts of one frame interfere with the corresponding parts of an adjacent frame.

One of the arms 37 is formed with an upwardly projecting arm 44 (Fig. 2) to which is connected one end of a spring 45 the other end of which is connected to an adjusting screw 46 on which is threaded a milled nut 47, which engages a bracket 48 through which the screw 46 passes and which is mounted on the segment 41. The motion of the arm 44 under the impulse of the spring 45 is adjustably limited by a screw 49, which is threaded through an ear 50 which is turned up from the bracket 40. A lock nut 51 secures the screw 49 in its adjusted position. The segment 33, the arms 37, and the parts connected therewith constitute a shiftable type bar carrier or hanger which is held in its normal position by the spring 45, this being the position in which the lower case type is adapted to

strike the platen. It will be observed that if a lower case key be struck sharply, the force which the link 25 exerts on the type bar tends to press the arm 44 more tightly against the stop 49, so that the violent operation of this key has no tendency to displace the carrier from its normal position. The bracket 40 has an ear 52 depending therefrom, and through this ear there is threaded a stop screw 53 having a lock nut 54. The screw 53 is in position to be engaged by an arm 55 depending from one of the arms 37 and to said arm 55 is connected the forward end of a link 56, the rear end of which is pivoted to an arm or lever 57, which is pivoted at 58 to a bracket 59, which is secured to the fixed segment 29 by a screw 60 passing through an ear of said bracket 59 and threaded into said segment 29. The bracket 59 extends below the screw 60 and has pivoted thereto at 61 a link 62 which lies parallel to the link 57 and has pivoted to the rear end thereof a universal bar or gate 63. A bracket or arm 64 rigidly secured to the universal bar 63, is pivoted at 65 to the link or lever 57. The construction is such that the lever 57 and the link 62 guide the universal bar 63 in a parallel up and down motion. If this universal bar be depressed, the lever 57 will be drawn to the position shown in Fig. 4 and the link 56 will draw the arm 55 back into contact with the stop screw 53, depressing the segment 33 into such position that the upper case type 24 will strike the platen. The form of the universal bars 63 will be best understood by reference to Fig. 1. Each of these universal bars consists of a rectangular frame comprising two vertical arms from which project brackets 66 which are in position to be engaged and depressed by arms 67 on those rock shafts 18 which are operated by upper case keys. Those rock shafts 18 which are operated by lower case keys do not operate the universal bars or gates 63. The construction is such that if an upper case key be depressed, its rock shaft will be oscillated, the arm 31 of such rock shaft will operate the link 30, bell crank 26, link 25, and type bar 22, and the arm 67 of such rock shaft will depress the corresponding gate 63 and draw the case shift mechanism to the position shown in Fig. 4. It will be perceived that the case shift mechanism is automatically operated by the upper case keys. By an inspection of Fig. 4 it will also be perceived that when an upper case key is depressed the link 56 stands about on the dead center of the lever 57, so that the type bar carrier is positively locked in its depressed position. It will also be perceived that the motion imparted to the type bar carrier by the link 56 is practically complete before the universal bar has reached its limit of motion, as the part of the motion of the

lever 57 near the dead center imparts very little longitudinal motion to the link 56. This being the case, the motion of the upper case type at the instant of impact with the platen is practically a motion of said type about the pivot of the type bar, and not a motion compounded of this pivotal motion and a motion of the pivot itself. It will also be perceived that the whole motion of an upper case type from its normal position to its printing position is a motion thus compounded, so that the upper case key and the lower case key impart different motions to the type carrier to bring one or another of the types to the printing point. It will also be perceived that the shiftable frames are connected with entirely independent case shift devices, that frame, one of whose type bars is being operated being the only one having a case shift motion imparted thereto.

In Fig. 5 the path of a lower case type to the printing point is represented by the line f ; and the path of an upper case type, when the lower case type is moved to printing position, is represented by the line f' . The path of an upper case type to the printing point is represented by the line g and the corresponding path of a lower case type by the line g' . In said figure, c is the pivotal center of a type bar when the frame is in normal position, and c' the pivotal center when said frame is in shifted position. It will be perceived that the motion of the frame from one of these positions to another is not a simple motion of translation, but is in the nature of a rotation about the pivot 39 as an axis. When the parts are in normal position the pivot points c of the seven type bars mounted on the one frame are arranged in the arc of a circle having the printing point d as a center. This circle lies in a plane which is tangent to the platen at the printing point. When the segment is shifted to the position shown in Figs. 4 and 5, said segment is not only moved farther from the printing point, but it is also rotated through an angle which is represented in Fig. 5 by the letter x , so that the center from which said segment is struck moves from the printing point d to a point d' in front of and below said printing point. When the segment is in its upper position with its center of curvature coinciding with the printing point, the different type bars on said segment move in paths which converge and meet at the printing point, and which if continued past the printing point, would diverge. The lower case types 23 are so located on the type bars as to meet at the printing point when the segment is in this upper position. When the segment is shifted the point of meeting of the lower case types is shifted, so to speak, from d to the point d' , after passing which last point the lower case types 23 begin to sep-

arate and the upper ends of the bars carrying the upper case types 24 approach nearer and nearer each other and will finally meet or coincide at the point d on the platen.

It is possible to proportion the parts so that the two types 23 and 24 may both be in a line that lies in the plane of motion of the type bar and so that the amount of divergence between the paths of the several type bars after passing the point d' shall just bring each of the upper case types to the printing point. This arrangement is an advantage, because where the types are arranged straight along the type bar the room or space in the type basket can be utilized to better advantage.

In Fig. 6 is shown a diagrammatic front view of one of the segments in normal position. In this figure d represents the printing point and at e are shown the positions of three of the upper case types when the corresponding lower case types are at the printing point. It will be seen that in each of the three type bars here diagrammatically represented, the upper and lower case types are so related that a line passing through said types lies in the plane of motion of the type bar on which they are mounted. Each of the upper case types represented at e , in moving to the position shown, has crossed the paths of the other two, and, if the types could move through a farther distance equal to the angle x , the three paths would intersect again at a point. When the segment is dropped down to the position shown in full lines in Fig. 5, these types do move through this additional angle, and the paths of all three meet at the printing point.

So far as I am aware it is broadly new to mount a plurality of type bars on a segment, each of said type bars having thereon a plurality of types disposed in a straight line longitudinally of the type bar and to provide means for shifting said segment so that all of said types will strike the platen at the same point. The proper proportions of parts to secure this result can be determined graphically, or they can be determined analytically from the following formula:—

$$\cos. x = \frac{\frac{a}{b} \cos. y}{\sqrt{1 - \frac{a^2}{b^2} \sin.^2 y}}$$

in which y is the angle between an outer type bar and the middle type bar of a set (Fig. 6); x is the angle through which the type bar frame is shifted (Fig. 5); a is the distance of a lower case type from the pivot point of its type bar; and b is the corresponding distance of an upper case type. When the segment is shifted the motion of the pivotal axis of the middle type bar is a simple motion of translation, the different

positions of the axis being parallel; but the different positions of the pivotal axes of the end type bars of the segment are not parallel. As a consequence of this the printing faces of the upper and lower cases types of these type bars lie in different planes. Also the distance between the two types on one of the outer type bars is slightly greater than the corresponding distance on the middle type bar. The relations between the two types on the several type bars are thus different and are somewhat complicated. For this reason I have mounted the two types on the type bar separately, each type being provided with a long shank so that the two types may be separately adjusted to the proper position by bending their respective shanks.

In Figs. 1 and 4 I have shown the type bars 22 resting at their free ends in a fixed basket or cushion 68. With this construction, when a segment is shifted the several type bars are drawn down to the position shown in Fig. 4 and the partial rotation of the segment about an axis results in the free ends of the type bars being drawn toward the middle type bar of the set and thus being somewhat bunched together. In case this is found to be objectionable, the construction shown in Fig. 5 may be employed. In this construction, each group of type bars is provided with a separate type rest 69 which is mounted on arms 70 which are secured to the arms 37 of the type bar carrier, so that when said carrier is shifted the free ends of the type bars drop to the position shown in Fig. 5 and do not bunch together.

Various changes in the details of construction and arrangement may be made without departing from my invention.

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

1. In a typewriting machine, the combination of a series of keys; a series of rock shafts operated by said keys; arms on said rock shafts; a series of sub-levers; means connecting each of said sub-levers with a plurality of said arms; and type bars operated by said sub-levers.

2. In a typewriting machine, the combination of a series of type bars arranged in a plurality of sets and each carrying a plurality of types; a plurality of sets of keys, one key for each type; and means whereby any key of one set may impart a case shift motion to the particular one only of said sets of type bars to which that key belongs.

3. In a typewriting machine, the combination of a series of type bars arranged in a plurality of sets; key controlled means for operating said type bars; and means for imparting a case shift motion to any one of said sets of type bars independently of the others.

4. In a typewriting machine, the combi-

nation of a series of type bars arranged in a plurality of sets, and case shift devices for the different sets of type bars, each of said case shift devices being capable of being operated without operating any other of said case shift devices.

5. In a typewriting machine, the combination of a plurality of independent segments pivoted to move radially toward and from the printing-point; type bars pivotally connected to said segments and provided each with a plurality of types, independent gates connected to said segments to move the same for case-shift; a plurality of key levers operatively connected to each type bar; and connections whereby certain of said key levers operate certain of said gates.

6. In a typewriting machine, the combination of a pivoted type bar provided with a plurality of type; a bell crank lever connected to said bar; a rod connected to said bell crank lever; shoulders or projections on said rod; key levers having slotted arms coacting with said projections or shoulders; and case shifting mechanism actuated by certain of said key levers.

7. In a typewriting machine, the combination of a pivoted type bar provided with a plurality of type; a bell crank lever connected to said bar; a vertical rod connected to said bell crank lever; balls on said rod; a plurality of rock-shafts arranged one over the other; arms on said shafts coacting with said balls to operate the rod and type bar; and case shifting mechanism operated by certain of said rock shafts.

8. In a typewriting machine, the combination of a plurality of independent carriers pivoted in the arc of a circle; a plurality of type bars for and pivotally connected to each of said carriers and provided each with a plurality of type, the pivot of each carrier being substantially parallel to the axis of motion of one of the type bars on that carrier; a plurality of key levers for each type bar; connections whereby said key levers actuate said type bars; and means whereby certain of said key levers actuate said carriers individually for case shifting.

9. In a typewriting machine, the combination of key-operated rock shafts arranged in a vertical row; arms on certain of said shafts; a vertically movable gate actuated by said arms; type bars, each provided with a plurality of type; means whereby a number of said shafts, equal in number to the type on the type bar actuated thereby, operate one and the same type bar; and case shifting mechanism actuated by said gate.

10. In a typewriting machine, the combination of a pivoted segment; a plurality of type bars pivotally connected to said segment, the axes of motion of said segment and of one of said type bars being parallel and said bars being each provided with a

plurality of type; a series of key levers equal in number to the aggregate of said type; means whereby key levers, equal in number to the type on the bar actuated thereby, operate each type bar; and means whereby certain of said key levers operate the said segment for case shifting.

11. In a typewriting machine, the combination of a segment, a series of type bars mounted on said segment, each of said type bars carrying a plurality of types each of which lies in the plane in which the type bar swings; and means for imparting to said segment a case shift motion such that any type of any type bar may swing to the printing point.

12. In a typewriting machine, the combination of a series of type bars mounted in a plurality of sets, each type bar carrying a plurality of types each of which lies in the plane in which the type bar swings; and means for imparting to one of said groups of type bars a case shift motion such that any type of any type bar may be swung to the printing point.

13. In a typewriting machine, the combination of a series of type bar carriers, each shiftable toward and from the printing point; a group of type bars mounted on each of said carriers, each type bar having a plurality of types; a series of keys, one for each type, a plurality of said keys being connected with each type bar; a series of universal bars, one connected with each shiftable carrier and controlled by certain of the keys which are connected with the group of type bars on that carrier.

14. In a typewriting machine, the combination of a segment, arms to which said segment is secured; a bracket lying behind said segment, said arms being pivoted to said bracket; adjustable stops mounted on said bracket; a spring for normally holding one of said arms in contact with one of said stops; and case shift mechanism for drawing one of said arms into contact with the other stop.

15. In a typewriting machine, the combination of a series of key operated rock shafts; a universal bar operated by certain of said rock shafts; parallel links on which said universal bar is mounted for up and down motion; and a shiftable type bar carrier operated by said universal bar.

16. In a typewriting machine, the combination of a plurality of sets of type bars; and means for imparting a case shift motion to any set of type bars independently of any other set.

17. In a typewriting machine, the combination of a series of type bars arranged in a plurality of groups, and each having a plurality of types; a series of keys, one for each type; a plurality of said keys being connected with each of said type bars; and

means controlled by certain of said keys for imparting a case shift motion to one of said groups of type bars but not to the others.

18. In a typewriting machine, the combination of a series of type bars arranged in a plurality of groups and each having a plurality of types; a series of keys, one for each type, a plurality of said keys being connected with each of said type bars; a plurality of universal bars, one for each group of type bars, each of said universal bars being controlled by certain of said keys; and means controlled by each universal bar for controlling the selection of the types within the corresponding group of type bars.

19. In a typewriting machine, the combination of a platen; a plurality of segments, each pivoted to swing toward and from the printing point about an axis parallel to the plane of the segment; a series of type bars mounted on each of said segments, each having a plurality of types; the construction and arrangement being such that when a segment is in position to print from the end type on a type bar, the center from which said segment is struck stands in front of the printing point.

20. In a front strike typewriting machine, the combination of a platen; a type bar segment pivoted to swing toward and from the printing point about an axis parallel to the plane of the segment; a series of type bars mounted on said segment, each type bar carrying a plurality of types, the construction and arrangement being such that when the segment is shifted to print from the type nearest the end of the type bar, the center from which the segment is struck is farther toward the front of the machine than when said segment is swung to print from another type.

21. In a front strike typewriting machine, the combination of a platen; a plurality of type bar segments, each pivoted to swing about an axis that stands behind said segment and is parallel to the plane of the segment; and a series of type bars mounted on each of said segments, the construction and arrangement being such that when one of said segments is in position for the lower type thereon to print, the center from which the segment is struck approximately coincides with the printing point, but when said segment is in position for an end type on a type bar to print said center stands in front of and below the printing point.

22. In a typewriting machine, the combination of a platen; a plurality of type bar segments, each pivoted to swing toward and from the printing point about an axis parallel to the plane of the segment; a series of type bars mounted on each of said segments, each type bar carrying a plurality of types, each of which lies in the plane in

which the type bar swings; and case shift devices for swinging said segments to cause one or another of the types on an operated type bar to print.

- 5 23. In a typewriting machine, the combination of a platen, a segment, a series of type bars mounted on said segment, each of said type bars carrying a plurality of types each of which lies in the plane in which the
10 type bar swings, and means for imparting

to one of the first two elements named a case shift motion, such that any type of any type bar may swing to the printing point.

Signed at Syracuse, in the county of Onondaga and State of New York, this 15 16th day of July A. D. 1904.

JOHN H. BARR.

Witnesses:

E. E. CORY,

ELIZABETH PURDY.