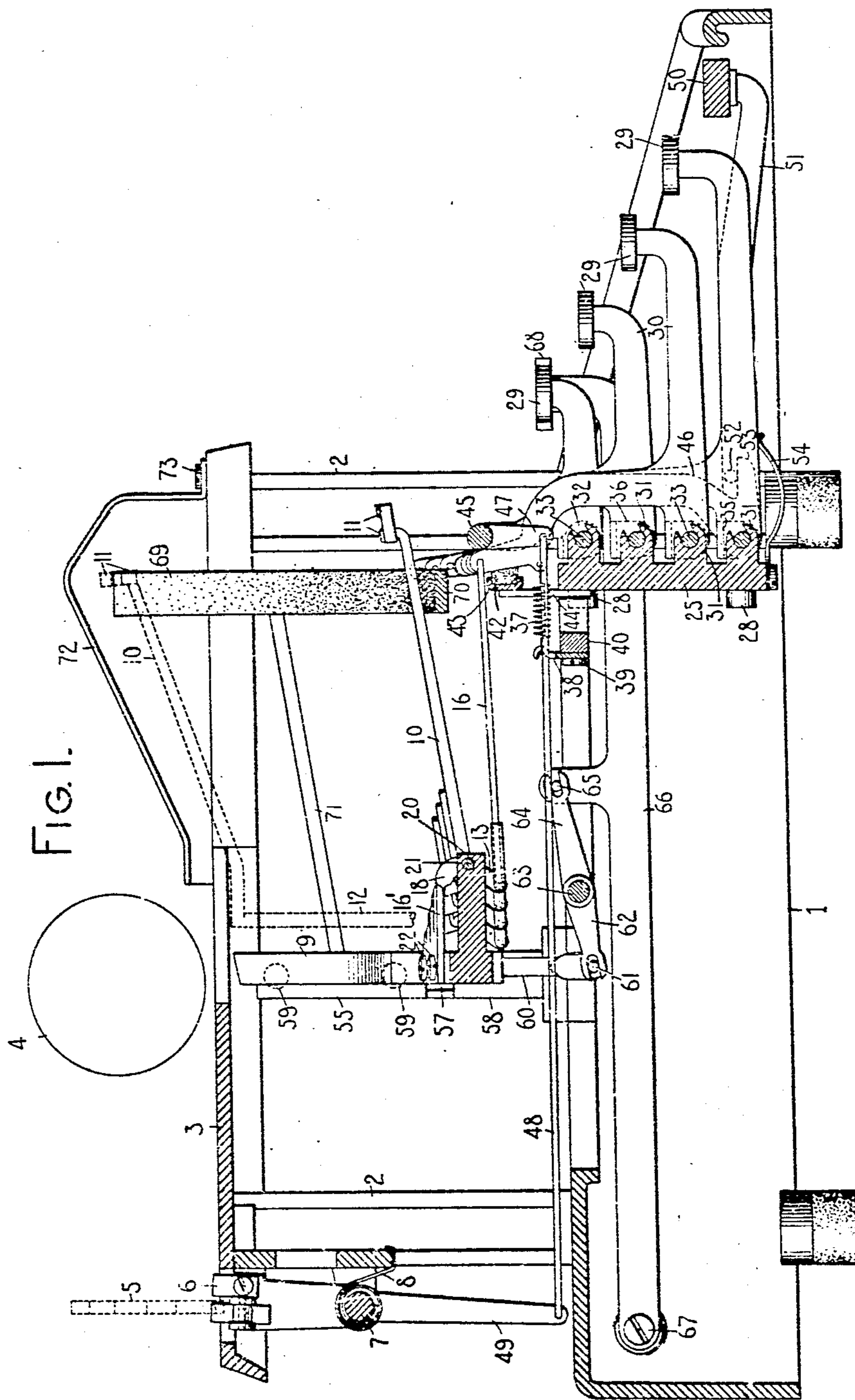


962,600.

R. H. STROTHER.
TYPE WRITING MACHINE.
APPLICATION FILED SEPT. 23, 1904.

Patented June 28, 1910.

4 SHEETS—SHEET 1.



WITNESSES.

E. M. Wells.
M. F. Hamner.

INVENTOR.

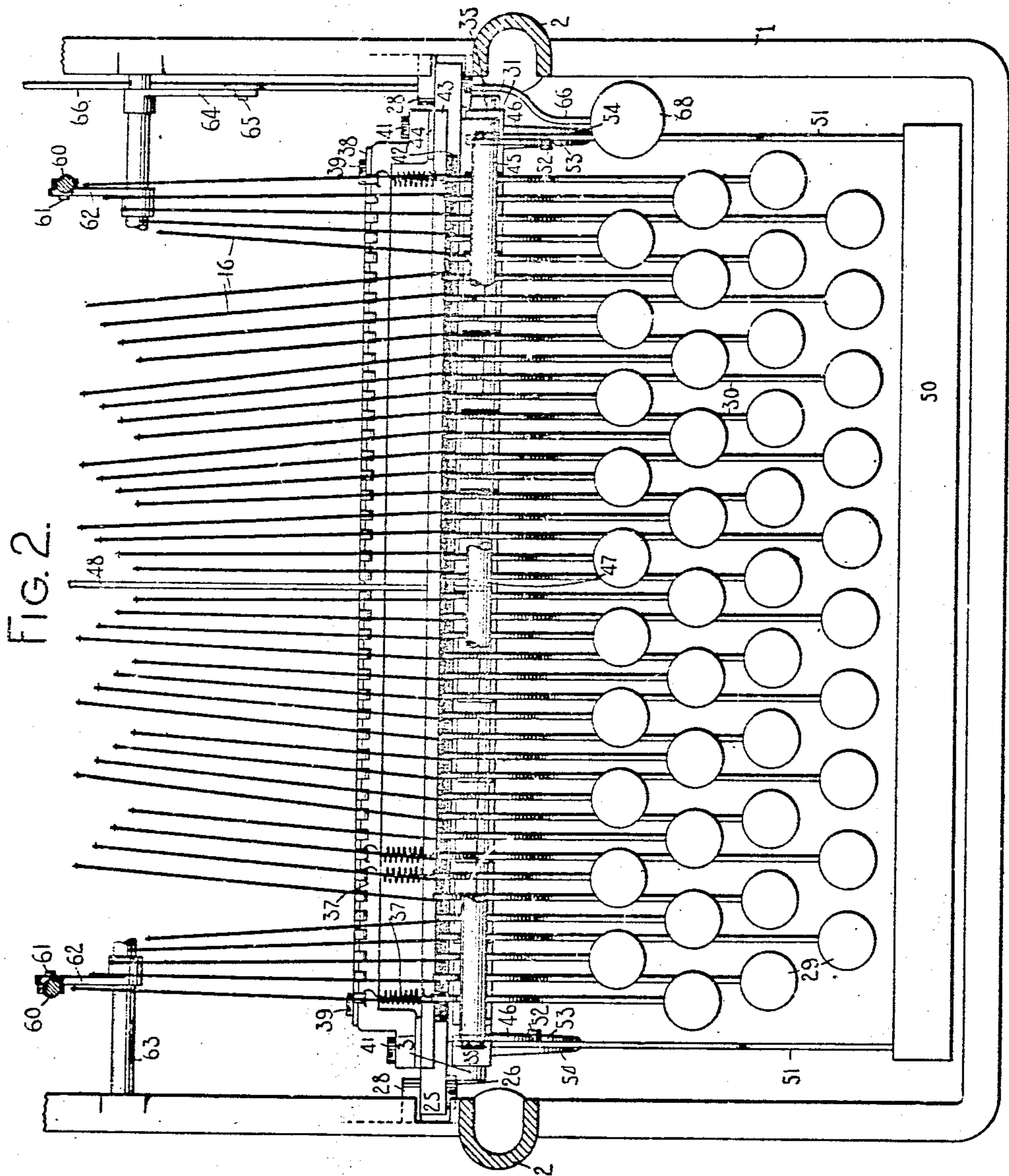
Robert H. Strother
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HIS ATTORNEY

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4 SHEETS—SHEET 2.



WITNESSES:

E. M. Wells.

M. F. Hammecker.

INVENTOR:

Robert H. Strother.

By Jacob Falbel

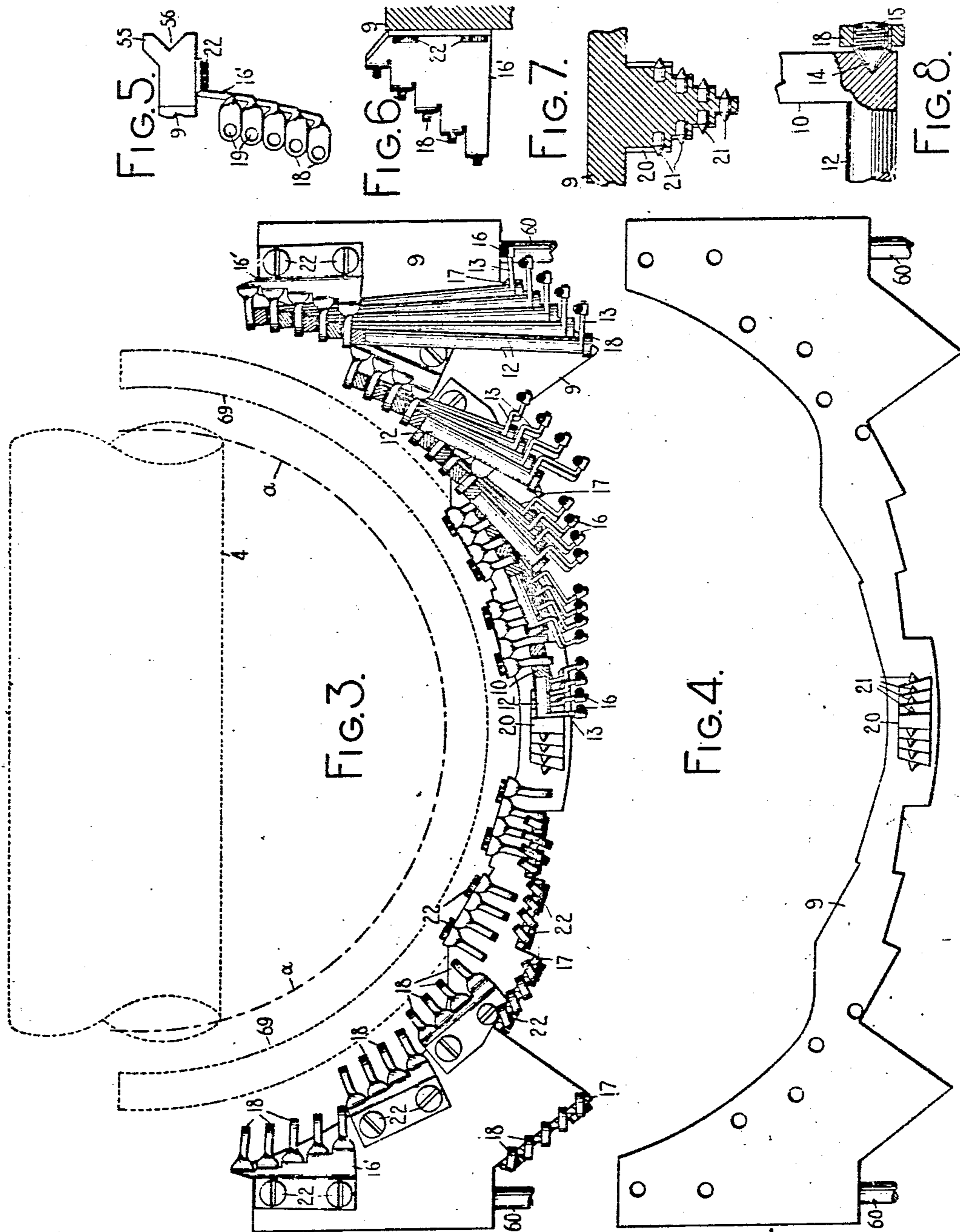
HIS ATTORNEY

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4 SHEETS—SHEET 3.



WITNESSES.

E. M. Wells.
M. F. Hammer.

INVENTOR.

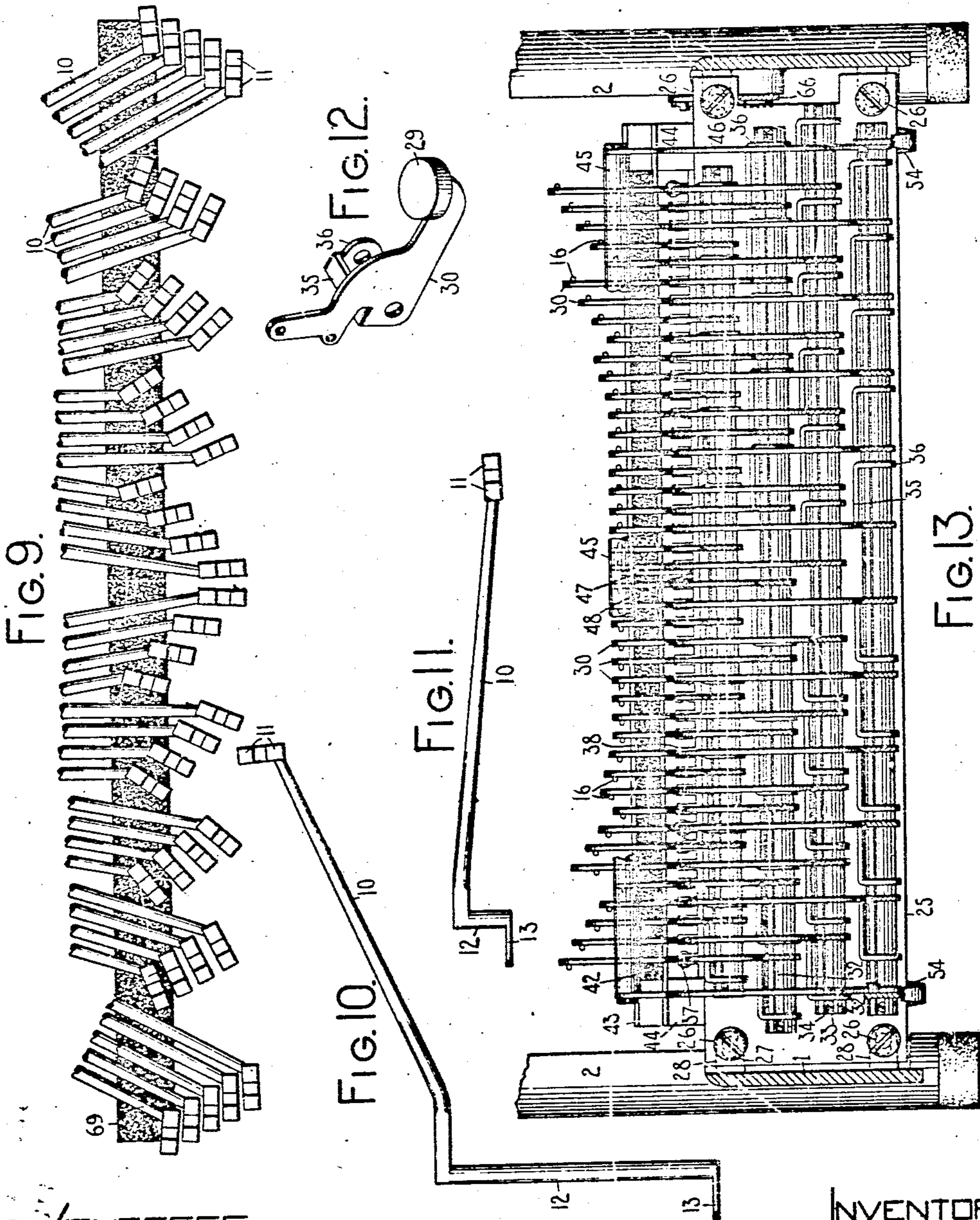
Robert H. Strother
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4 SHEETS—SHEET 4.

962,600.



WITNESSES.

E. M. Wells.
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Robert H. Strother
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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.

962,600.

Specification of Letters Patent. Patented June 28, 1910.

Application filed September 23, 1904. Serial No. 225,673.

To all whom it may concern:

Be it known that I, ROBERT H. STROTHER, a 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 it has for its principal object to provide an improved type action and key action for a front strike typewriting machine.

My invention consists in certain features of construction and combinations and arrangements of parts, all as will be hereinafter more fully described and particularly pointed out in the claims.

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

Figure 1 is a front to rear vertical section of a typewriting machine; Fig. 2 is a top plan view of a portion of said machine; Fig. 3 is a front elevation of the type bar segment showing the hangers in position thereon and also showing some of the type bars, said type bars being shown sectioned away close to the hangers; Fig. 4 is a view similar to Fig. 3 but with the type bars and hangers removed; Figs. 5 and 6 are a top and side view respectively of one of said hangers; Fig. 7 is a horizontal section of a portion of the type bar segment; Fig. 8 is an enlarged detail view showing one of the type bar pivots; Fig. 9 is a view of the type basket as it would appear if developed; Figs. 10 and 11 are detail views showing one of the end and one of the middle type bars respectively; Fig. 12 is a perspective view of one of the key levers; and Fig. 13 is a front view of the key lever system, the key carrying arms of said key levers being sectioned away in front of their pivots.

The main frame of the machine shown in the present case comprises a base portion 1 from which rise posts 2 which support a top plate 3. A platen 4 is mounted on a carriage which may be of any known or suitable construction and which may be drawn across the machine by the usual spring drum or in any suitable manner, and the feed of which is controlled by an escapement wheel 5 (Fig. 1), said escapement wheel being in turn controlled by feed dogs 6 which are mounted on a dog rocker 7 which is

controlled by a spring 8 in the usual manner. I have not illustrated these parts in detail, their precise construction being immaterial so far as the present invention is concerned.

The type bars are mounted on a segment 9 which has the general form best shown in Fig. 4. As best shown in Figs. 10 and 11, each of the type bars comprises a type arm 10 having one or more types 11 mounted on its free end, an axle, shaft, or pivot portion 12 and a crank arm 13. The axle or shaft is formed at each end with a conical depression into which fits the conical end 14 of a pivot pin or screw 15 (Fig. 8). As best shown in Fig. 1, a link 16 is pivoted at one end to the crank arm 13 and at the other end to means whereby said link is operated to throw the type bar to the printing point. As the type bars are mounted to strike the upper front quadrant of the platen I shall refer to them as front-strike type bars. In the present instance I have shown a series of forty-two type bars and, as will be understood by reference to Figs. 3 and 9, said series is divided into two sets, the type bars being oppositely disposed in the different sets. One of said sets extends from the middle of the segment to the right-hand end thereof, and the other set extends from the middle of the segment to the left-hand end thereof. In the former the crank arms 13 of those type bars which are near the middle of the segment are at the left-hand ends of their respective axles and the type carrying arms 10 are at the right-hand ends of said axles, whereas in the other set the crank arms are at the right-hand ends of the axles and the type arms at the left-hand ends thereof. Each of said sets of type bars is divided into groups. In the present instance, I have shown four groups of four type bars each and one group at the end of the segment of five type bars. I prefer to mount all of the type bars of each group in a single pair of hangers, one hanger 16' supporting the type bars at those ends of their axles from which the type arms spring and another hanger 17 supporting said type bars at the opposite ends of said axles, that is to say, at the ends adjacent the crank arms. Each of the hangers 16' and 17 may be formed of sheet metal having arms or fingers 18 (Figs. 5 and 6) bent as shown to form ears having openings 19 (Fig. 5)

therein through which the pivot screws 15 are threaded. The group of type bars nearest the middle of the segment has no hanger 17, but instead a stepped lug or projection 20 is formed on the front face of the segment at the middle thereof and, as best shown in Fig. 7, pivot pins 21 are set into the faces of the steps of said projection. These pivot pins support the ends of the type bars of the two middle groups. The hangers 16' and 17 are secured to the segment 9 by screws 22, some of said hangers being thus secured to the front face of the segment and some of them to the edges of the segment as shown in Fig. 3. In order that the form of these hangers may be clearly understood, the hanger 16' of the end group of type bars is shown in Figs. 5 and 6 in top and right-hand end views respectively. It will, of course, be understood that individual hangers may be employed if preferred. I prefer to mount all of the type bars on the same side of the segment 9. As is shown in the drawings, the type bars of the different groups are arranged one in front of another, in echelon, or skewed arrangement, the one nearest the end of the segment being nearest to the face of the segment. The effect of this disposition of the type bars upon the arrangement of the types in the basket is clearly shown in Fig. 9.

Where in the claims I have used the word "front", as where one type bar axle is said to be in front of another, I mean in front as viewed when looking perpendicularly toward the plane of the segment from the direction in which the type bars project. Thus, if my segment were swung up to change the machine into a top strike machine, then, in the sense in which I use the term, one axle would be in front of another if it so appeared when viewed from above.

The type bars are segmentally arranged, those nearest the middle of the segment having their axles inclined but slightly to the horizontal and the succeeding type bars having their axles inclined at increasing angles to the horizontal. In the present instance, I have utilized a little more than a semi-circle for the type basket. It will accordingly be seen by reference to Fig. 1 that the end type bar of each set, one of which is shown in said figure in dotted lines, has its type standing a little above the printing point, and it will also be seen by reference to Fig. 3 that the axle of this type bar inclines slightly inward, being set at an angle a little past the vertical. There is thus ample room in the type basket for the number of types here used, and partly for this reason, it is not necessary that the type bars swing through an angle of 90°, but they may stand normally in the position shown in Fig. 1, by reference to which it will be

seen that the types of the middle type bar stand some little distance above a horizontal plane through the pivotal axis of this type bar. The faces of the types normally lie approximately in an arc which is represented by the broken line *a* in Fig. 3.

By reference to Fig. 3, it will be perceived that some of the type bars which lie nearest to the face of the segment in the first, second and third groups from the center have their pivot points behind the axles of some of the type bars of the second, third and fourth groups respectively which lie farthest from the segment. The type arms of these type bars are bent upward to avoid interference with the axles of those type bars which lie in front of them. It will also be seen by reference to said Fig. 3 that some of the crank arms 13 are formed with offset bends in order to bring the point in these arms at which they are pivoted to the links 16 into proper position. It will also be seen that the several type bars have their axles of different lengths, those near the middle of the segment being comparatively short and those near the end of the segment being comparatively long. The arrangement is such that all of the crank arms 13 of the first two groups and the first crank arm of each of the other groups have their points of connection with the links 16 in the same horizontal plane, or in other words, at the same elevation, and that the remaining crank arms have their points of connection with their links 16 not very far removed from the same plane. The type bars in different portions of the system also have their type arms at different angles with their axles. This will be apparent from Figs. 1, 9, 10 and 11.

In Fig. 10 there is shown one of the end type bars and it will be seen that the type carrying arm of this type bar forms an obtuse angle with the axle of said bar, whereas in Fig. 11, which shows one of the middle type bars, it will be seen that the type carrying arm of this bar stands at an acute angle with its axle. By this is meant that a line from the type carrying end of one of these type bars to the point where the type carrying arm joins the axle, is at an acute or an obtuse angle with the axle. The manner in which the type carrying arm may be bent between these two points is immaterial so far as the particular matter here referred to is concerned. As has been pointed out above, the type block of the end type bar stands a little above the line of writing and the end of the axle of this type bar stands below the platen. It is necessary therefore, that the type carrying arm forms an obtuse angle with the axle.

It will be seen by reference to Fig. 9 that the two middle type blocks lie near each other in the basket and that the space be-

tween the middle type block and the end type block is more or less uniformly divided between the type blocks of the intervening type bars. By this arrangement and construction I am enabled to utilize more than a semi-circle in which to dispose the type blocks in the type basket, although considerably less than a semi-circle is available on the type bar segment in which to dispose the pivots. It will be understood from what has been said and from an inspection of Fig. 9 that the type carrying arms of those type bars which lie between the middle type bar and the end type bar of a set are disposed at different angles with their axes, said angles being intermediate between the obtuse angle shown in Fig. 10 and the acute angle shown in Fig. 11.

By an inspection of Fig. 3 it will be seen that the available part of the arc of the type bar segment is approximately uniformly divided between the different type bars, each of which occupies in said arc only so much space as is necessary to accommodate the type carrying arm and the ear 18 of the hanger 16 which belongs to that particular type bar. In spite of this limited space in the arc which can be assigned to each type bar the pivots of the type bars are made very long. Room for these elongated pivots or axles is obtained by the arrangement of the type bars in groups in the manner which has been described, the axle of one type bar lying in front of that of the next succeeding type bar in the group. It will be perceived that in the case of those type bars whose pivots are more nearly vertical and in which therefore long pivots are most necessary, the length of the pivot of each individual type bar is considerably greater than the length of the arc which can be assigned to the entire group. The pivotal axes of the type bars may be in other forms than that of the straight axes here shown and described.

I prefer to mount all of the mechanism of the key action on a detachable frame piece 25 which extends across the machine within the base portion 1 of the main frame and which is secured to the side plates of said base portion by screws 26 (Figs. 2 and 12) which pass through elongated openings 27 in the frame piece 25 and are threaded into lugs or ears 28 which project inward from the side plates of the main frame. The construction is such that the entire key action may be assembled outside of the machine and may be inserted into the machine and secured in position by means of the screws 26. As shown in Figs. 1 and 2, the keys 29 are arranged in a plurality of transverse rows, four such rows being shown in the present case. The keys are mounted on the forwardly extending arms of bell crank key levers 30 which are pivotally mounted on

the frame piece 25 and which have upwardly extending arms to which the links 16 are pivoted at their forward ends. The frame piece 25 has formed at its front face four transversely extending ribs 31 having elongated slots 32 formed therein and in these slots lie pivot rods or wires 33 which are secured in position in the bottoms of the slots by screws 34 (Fig. 13). The several pivot wires 33 stand at different elevations and all of the key levers whose keys lie in the back one of the four rows of keys are pivoted on the uppermost one of these wires; those key levers pertaining to the second row of keys are pivoted on the second wire; those key levers belonging to the third row of keys, on the third wire; and those belonging to the fourth row of keys, on the lowermost wire. It will be perceived that the horizontal lever arms of the key levers belonging to the first or upper row of keys are much shorter than the corresponding lever arms belonging to the other rows. By pivoting the key levers belonging to the different rows at different elevations I am enabled to provide key levers for the different rows in which the ratio between the lever arms of each lever is constant, so that a given depression of a key in one row imparts the same extent of motion to the corresponding link 16 as the same depression of a key in another row. As will be perceived by comparing Figs. 1, 3 and 13, the upwardly extending arm of each of the key levers 30 terminates at an elevation corresponding to the elevation of the corresponding type bar crank arm, so that all of the links 16 lie substantially horizontal or at substantially the same inclination to the horizontal. Most of the key levers 30 have their upwardly extending arms terminating at substantially the same elevation, but some of them project above the general level. These latter key levers will, therefore, impart a greater extent of motion to their links 16 than the others, and to compensate for this difference the crank arms 13 connected with said levers are made a little longer than the other crank arms of the system, so that a given depression on any key imparts the same extent of motion to its type bar.

In order to steady the key levers against any sidewise motion, each of said levers, as best shown in Figs. 12 and 13, has a yoke bar 35 bent off therefrom, and an ear 36 is bent downward from said yoke bar parallel to the key lever and said ear is perforated and pivoted on the pivot wire 33. The key levers are thus provided with long bearings, which obviate the necessity for any comb plates. The upwardly extending arms of the key levers stand in front of and out from the frame piece 25, and the yoke bar 35 of one key lever lies behind the arms of some of the adjacent key levers of other

rows. The ribs 31 have transverse slots cut therein into which the key levers 30 and the ears 36 extend, and the walls of these slots prevent endwise motion of the key levers along the pivot wires. It will be perceived that both the type bars and the key levers are pivoted on long bearings and are directly connected by links, so that the entire system is free from rubbing bearings of any sort. No sub-levers are used in the system.

The key levers are returned to normal position by springs 37 (Figs. 1 and 2) which are connected at one end to said key levers above the frame piece 25, and at their rear ends are connected to hooks formed on the upper edge of a plate 38 which is secured by screws 39 to a bar 40 which is secured by screws 41 to the frame plate 25. I prefer to provide an arresting member for the key levers. Said arresting member comprises a pad 42 of sound deadening material which is mounted on a plate 43 which is supported by arms 44 which rise from the frame piece 25. As shown in the present instance, the arms 44 lie between the bar 40 and the frame piece 25 and are secured in position by the screws 41. The universal bar 45 is also mounted on the frame piece 25. As will be understood by the foregoing description of the key mechanism, the upwardly extending arms of all of the key levers have the same extent of motion at the elevation of the upper ends of these key levers which are near the middle of the machine. In order that all the keys may impart the same extent of motion to the universal bar, said universal bar is placed in front of the key levers at this elevation. The universal bar is mounted at its ends on arms 46 which are pivoted on the lowermost one of the pivot wires 33. As shown in Figs. 1 and 2 an arm 47 extending downward from the universal bar is connected by a link 48 with an arm 49 which extends downward from the dog rocker 7. The construction is such that the dog rocker will be operated upon the depression of any key. The space bar 50 is also mounted on the detachable frame piece 25. This bar is mounted on the forward ends of arms 51 which are pivoted on the lowermost one of the pivot wires 33, and each of said arms has projecting therefrom a pin 52 which lies over an arm 53 which projects toward the front of the machine from the arm 46 of the universal bar. The construction is such that when the space bar is depressed the universal bar will be operated. The space bar is held in normal position by a spring or springs 54.

It will be perceived that the key levers, their returning springs, their arresting pad, the universal bar, and the space bar are all mounted on the detachable frame piece 25, so that this whole mechanism may be as-

sembled outside of the machine and may be placed in the machine as an entirety and secured in position by means of the screws 26. The mechanism which may thus be assembled separately comprises all of the working parts shown in Fig. 2 except the case shift mechanism.

I prefer to mount two types 11 on each type bar as shown in the drawings. It is obvious that the platen may be shifted up and down to bring it into the path of one or the other of these types, but I prefer to impart the case shift motion to the type bar segment. It is for this reason that I have given all of the links 16 the same inclination to the horizontal. The segment may be guided by any suitable means for shifting up and down. As shown in Figs. 1 and 5, the segment 9 is formed at its ends with a flange 55 and in the edges of the segment are formed ball races 56 (Fig. 5) which cooperate with ball races 57 (Fig. 1) formed in the inward faces of posts, 58 which are secured to, or form parts of, the main frame of the machine. The segment is guided in its up and down motion by anti-friction balls 59 which run in these races and which may be supported therein in any suitable manner. An arm 60 extends downward from the segment near each end thereof, and each of said arms has a pin 61 projecting therefrom into a slot formed in the end of an arm 62 which is rigidly secured to a rock shaft 63, which is journaled in the side plates of the main frame. The shaft 63 has projecting forwardly therefrom an arm 64 having at its end a slot into which a pin 65 projects from the side of a shift key lever 66 which extends toward the back of the machine and is pivoted on a shouldered and headed screw 67, which is threaded into one of the side plates of the main frame. The lever 66 extends forward to the keyboard of the machine where it has mounted thereon a case shift key 68. As shown in Fig. 13, the frame piece 25 is cut away at its end to accommodate the lever 66. The construction is such that the segment 9 normally stands in its lower position as shown in the drawings, but said segment may be elevated to the upper case position by depressing the key 68. The motion of the segment in both directions may be limited by the engagement of the lever 66 with the ends of the cut-away portion of the frame piece 25, or any known or suitable means may be provided for this purpose.

The free ends of the type bars normally rest against a pad 69 which is mounted on a segment 70 (Fig. 1), which is supported by arms 71 which project from the segment 9.

I have shown a hood 72 secured upon the top plate 3 by screws 73 for the purpose of shielding the upper type bars to prevent

contact of the arms or hands of the operator therewith when adjusting the paper on the platen.

I have illustrated and described one embodiment of my invention in detail, but it will be understood that said invention is not limited to the precise construction here set forth but many changes may be made in the said construction without departing from the invention.

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

1. In a typewriting machine, the combination of a type bar segment and a segmentally arranged series of front strike type bars mounted on said segment, each of said type bars comprising an axle and a type carrying arm on said axle substantially at one end thereof, said type bars being arranged in a right hand set and a left hand set, and the type bars in each set having their type carrying arms at the ends of their axles nearest the end of the segment.

2. In a typewriting machine, the combination of a type bar segment, a segmentally arranged series of front-strike type bars mounted on said segment and arranged in a right hand set and a left hand set, each of said type bars comprising an axle and a type carrying arm substantially at one end of said axle, a plurality of the type bars of each set having their axles extending from their said ends downward and toward the middle of the segment.

3. In a typewriting machine, the combination of a type bar segment, a segmentally arranged series of front-strike type bars disposed on the same side of said segment and arranged in a right hand set and a left hand set, each of said type bars comprising an axle and a type carrying arm substantially at one end of said axle, a plurality of the type bars of each set having their axles extending from their said end downward and toward the middle of the segment.

4. In a typewriting machine, the combination of a type bar segment and a segmentally arranged series of front strike type bars mounted on said segment and arranged in a right hand set and a left hand set, the type bars of each set being in groups, each type bar comprising an axle and a type carrying arm substantially at one end of said axle, a plurality of the axles of each set extending from their said ends downward and toward the middle of the segment and the axles of each group standing one in front of another.

5. In a typewriting machine, the combination of a type bar segment and a segmentally arranged series of front strike type bars mounted on said segment and arranged in groups, each type bar comprising an axle and a type carrying arm substantially at one end of said axle, those type bars near the

ends of the segment having their axles extending from their said ends downward and those type bars near the middle of the segment having their axles extending toward the middle of the segment, and the axles of one group extending alongside of those of an adjacent group.

6. In a typewriting machine, the combination of a type bar segment, and a segmentally arranged series of front strike type bars pivotally mounted on said segment, the type-arms in different parts of the segment standing at different angles to their pivotal axes.

7. In a typewriting machine, the combination of a type bar segment, and a segmentally arranged series of front strike type bars pivotally mounted on said segment, each of said type bars comprising an axle and a type carrying arm, the type carrying arms of said type bars standing at different angles to their respective axles in different parts of the segment.

8. In a typewriting machine, the combination of a type bar segment, a series of front strike type bars pivotally mounted on said segment, each comprising an axle and a type carrying arm, the type carrying arms of the type bars in different parts of the segment standing at different angles to their respective axles, those type bars near the ends of the segment having their type carrying arms inclined toward the ends of the segment.

9. In a typewriting machine, the combination of a type bar segment, a series of front-strike type bars segmentally arranged on said segment in two sets, the type bars in different parts of each set standing at different angles with their pivotal axes, those type bars near the end of the segment standing at an inclination toward the end of the segment.

10. In a typewriting machine, the combination of a segmentally arranged series of front-strike type bars, each comprising an axle and a type carrying arm substantially at one end of said axle, the type carrying arms of the type bars in different parts of the segment standing at different angles with their respective axles, and means for supporting said type bars.

11. In a typewriting machine, the combination with the platen, of a segmentally arranged series of front-strike type bars each comprising an axle and a type carrying arm substantially at one end of said axle, said type bars having their axles of different lengths, those type bars near the middle of the segment having their axles comparatively short and those near the ends of the segment having their axles comparatively long; and a series of keys and connections for operating said type bars.

12. In a typewriting machine, the combination of a type bar segment, a series of front-strike type bars segmentally arranged on said segment in two sets, the type bars in different parts of each set standing at different angles with their pivotal axes, those type bars near the end of the segment standing at an inclination toward the end of the segment.

nation with the platen of a series of front-strike type bars segmentally arranged in two sets, each type bar comprising an axle and a type carrying arm substantially at one end of said axle, the type bars of the different sets being oppositely disposed and the type bars of each set having their axles of different lengths, those near the middle of the segment having their axles comparatively short and those near the end of the segment having their axles comparatively long; and means for operating said type bars.

13. In a typewriting machine, the combination with the platen, of a series of front-strike type bars segmentally arranged in groups, each type bar comprising an axle and a type carrying arm substantially at one end of said axle, the type bars of each group being disposed one in front of another, and the type bars having their axles of different lengths, those type bars near the middle of the segment having their axles comparatively short and those near the ends of the segment having their axles comparatively long; and means for operating said type bars.

14. In a typewriting machine, the combination with the platen, of a series of front-strike type bars segmentally arranged in two sets, each type bar comprising an axle and a type carrying arm substantially at one end of said axle, the type bars in the different sets being oppositely disposed and each set being arranged in groups the type bars of which are disposed one in front of another, and the type bars of each set having their axles of different lengths, those type bars near the middle of the segment having their axles comparatively short and those near the end of the segment comparatively long; and means for operating said type bars.

15. In a typewriting machine, the combination with the platen, of a segmentally arranged series of front-strike type bars comprising type carrying arms, axles and crank arms, the axles of those type bars which are near the ends of the segment being elongated and having the type arms situated above the crank arms; and operating devices connected with said crank arms.

16. In a typewriting machine, the combination of a series of front-strike type bars segmentally arranged in a right hand and a left hand set, each of said type bars comprising an axle and a type carrying arm substantially at one end of said axle, the type bars in the different parts of each set having their type carrying arms at different angles with said respective axles, and the type bars of each set being disposed in groups, the type bars of each group having their axles standing one in front of another.

17. In a typewriting machine, the combination of a segmentally arranged series of front strike type bars, each type bar com-

prising an axle, a type carrying arm substantially at the end of said axle nearest the end of the series, and a crank arm substantially at the opposite end of said axle, links connected to said crank arms and extending toward the front of the machine, and a series of keys connected with said links.

18. In a typewriting machine, the combination with the platen, of a segmentally arranged series of front-strike type bars, each comprising a type carrying arm and a crank arm, the crank arms of those type bars near the end of the segment being disposed below their respective type carrying arms, whereby the series of crank arms is more nearly horizontally disposed than the series of type carrying arms; operating links connected to said crank arms; and key controlled devices connected to said operating links.

19. In a typewriting machine, the combination with the platen, of a series of front-strike type bars arranged in groups; each type bar comprising a type carrying arm, a shaft or axle, and a crank arm, said type carrying arm and crank arm being disposed at different points longitudinally of said shaft, and the type bars of each group being disposed one in front of another in skewed arrangement.

20. In a typewriting machine, the combination with the platen, of a segment, a series of front-strike type bars mounted on said segment and arranged in groups; each of said type bars comprising a type carrying arm, a shaft or axle, and a crank arm, said type carrying arm and crank arm being disposed at different points longitudinally of said axle; all of the type bars of each group lying on the same side of the segment, and the type bars of each group being disposed one in front of the other in skewed arrangement.

21. In a typewriting machine, the combination with the platen, of a segment; a series of front-strike type bars mounted on said segment; each of said type bars comprising a type carrying arm, a shaft or axle, and a crank arm, said type carrying arm and crank arm being disposed at different points longitudinally of said axle, and said type carrying arms and crank arms being at different distances apart in the type bars on different portions of the segment.

22. In a typewriting machine, the combination with the platen, of a group of front-strike type bars, each comprising an axle or shaft and a type carrying arm substantially at one end thereof, the axles of the type bars of the group being disposed in skewed arrangement and progressively as to their respective distances from the plane of their support.

23. In a typewriting machine, the combination with the platen, of a segment; a

group of front-strike type bars mounted on said segment, each of said type bars comprising a type carrying arm and an axle or shaft, the type bars of the group having their axles disposed in skewed arrangement and progressively as to their respective distances from the plane of their support, and that type bar of the group whose axle is remotest from the type bearing ends of the type bars being also nearest the end of the segment.

24. In a typewriting machine, the combination with the platen, of a segment; a group of front-strike type bars mounted on one side of said segment, and each comprising an axle and a type carrying arm, the type bars of the series having their axles disposed in skewed arrangement and progressively as to their respective distances from the plane of their support, and that type bar whose type carrying arm is nearest the end of the segment having its axle remotest from the type bearing ends of the type bars.

25. In a typewriting machine, the combination of a main frame, a carriage supported by said main frame, a series of key levers, an arresting member for arresting said key levers on their return to normal position, and a frame detachably mounted on said main frame and on which said key levers and arresting member are mounted.

26. In a typewriting machine, the combination of a main frame, a carriage supported by said main frame, a series of key levers, restoring springs for said key levers, an arresting member for arresting said key levers on their return to normal position, and a frame detachably mounted on said main frame and on which said key levers, restoring springs and arresting member are mounted.

27. In a typewriting machine, the combination with the main frame, of a key action mechanism comprising a series of key levers, restoring springs for said key levers, an arresting member for said key levers, and a universal bar, said mechanism being detachable as an entirety from said main frame.

28. In a typewriting machine, a bell crank key lever comprising a forwardly extending arm, an upwardly extending arm, a yoke bar, and two bearing portions connected by said yoke bar.

29. In a typewriting machine, the combination of a frame piece; and a series of bell crank key levers pivotally mounted on said frame piece at different elevations, said key levers comprising forwardly and upwardly extending arms and spaced bearing portions connected by yoke bars, the yoke bar of one key lever lying behind the arms of adjacent key levers.

30. In a typewriting machine, the combination of a segmentally arranged series of

front-strike type bars, each type bar comprising an axle, a type carrying arm substantially at one end of said axle, and a crank arm substantially at the opposite end of said axle, links connected to said crank arms and extending fore and aft of the machine, and a series of keys connected with said links, the type carrying arms standing at different angles to their respective axles in different parts of the system.

31. In a typewriting machine, the combination of a segmentally arranged series of front-strike type bars, each type bar comprising an axle, a type carrying arm substantially at one end of said axle and a crank arm substantially at the opposite end of said axle, links connected to said crank arms and extending fore and aft of the machine, and a series of keys connected with said links, said series of type bars being divided into groups, the axles of the type bars of each group lying one in front of another.

32. In a typewriting machine, the combination of a segmentally arranged series of front-strike type bars, each type bar comprising an axle, a type carrying arm substantially at one end of said axle and a crank arm substantially at the opposite end of said axle, links connected to said crank arms and extending fore and aft of the machine, and a series of keys connected with said links, said series of type bars being divided into groups, the axles of the type bars of each group lying one in front of another and each of the type carrying arms of a group lying between one of its own pivotal supports and a pivotal support of an adjoining type carrier arm.

33. In a typewriting machine, the combination of a platen, a type bar support, and a series of front-strike type bars thereon, said type bars having elongated axles and being arranged in two sets, each set comprising a plurality of groups disposed segmentally on the support between its center and one of its ends and each group comprising a plurality of type bars progressively arranged both as to their respective distances from the plane of their support and also laterally on said support.

34. In a typewriting machine, the combination of a platen, a type bar support, and a series of front-strike type bars thereon, said type bars having elongated axles and being arranged in two sets, each set comprising a plurality of groups disposed segmentally on the support between its center and one of its ends and each group comprising a plurality of type bars progressively arranged both as to their respective distances from the plane of their support and also laterally on said support, the elongated axles of the type bars in the several groups in each set overlapping one another.

35. In a typewriting machine, the com-

5 combination of a type bar support, and a segmentally arranged series of front-strike type bars mounted on said support, each of said type bars comprising an axle and a type
 10 carrying arm on said axle substantially at one end thereof, said type bars being arranged in a right-hand set and a left-hand set, each set comprising a plurality of groups and each group comprising a plu-
 15 rality of type bars progressively arranged both as to their respective distances from the plane of their support and also laterally of the machine.

36. In a typewriting machine, the combination of a type bar support, and a segmentally arranged series of front-strike type bars mounted on said support, each of said type bars comprising an axle and a type
 20 carrying arm on said axle substantially at one end thereof, said type bars being arranged in a right-hand set and a left-hand set, each of said sets comprising a plurality of groups, the axles of the type bars of the
 25 several groups overlapping one another and the axles of each group disposed progressively as to their respective distances from the plane of their support.

37. In a typewriting machine, the combination of a platen; a segmental type bar
 30 support below said platen; a series of type

bar hangers thereon; type bars each comprising a body portion and an axle mounted in said hangers; and means for actuating said type bars, the distances, measured along the axles, between the body portions of the type bars and their actuating means increasing from the middle to the sides of the system.

38. In a typewriting machine, the combination of a platen; a segmental type bar support below said platen; a series of type bar hangers thereon; type bars, each comprising a body portion and an axle, mounted in said hangers; and means for actuating said type bars, the body portion of each type bar being arranged at substantially one end of its axle and the actuating means for the type bars being connected with their axles at distances from the body portions which increase from the center to the sides of the system.

Signed at the borough of Manhattan, city of New York, in the county of New York, and State of New York, this 22nd day of September, A. D. 1904.

ROBERT H. STROTHER.

Witnesses:

E. M. WELLS,

M. F. HANNWEBER.