

No. 827,514.

PATENTED JULY 31, 1906.

H. S. DUKES.
VERTICAL PLANE TYPE WRITER.
APPLICATION FILED FEB. 1, 1900.

6 SHEETS—SHEET 1.

Fig. 1.

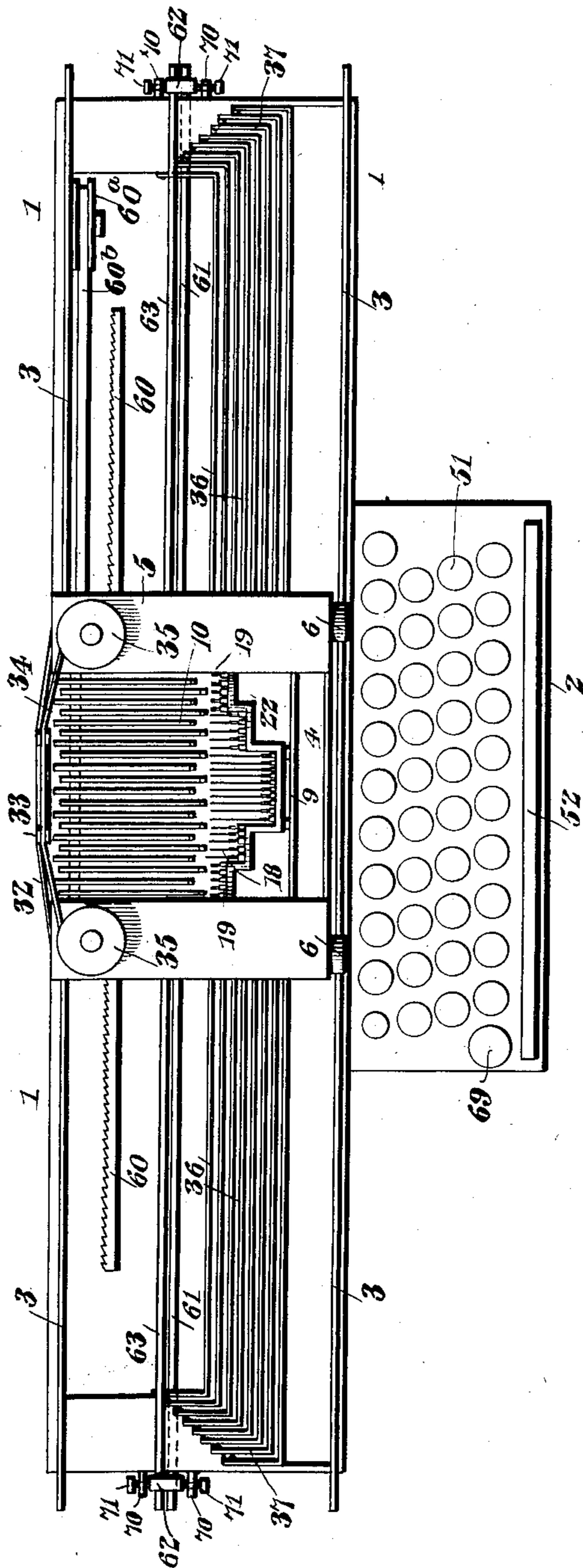
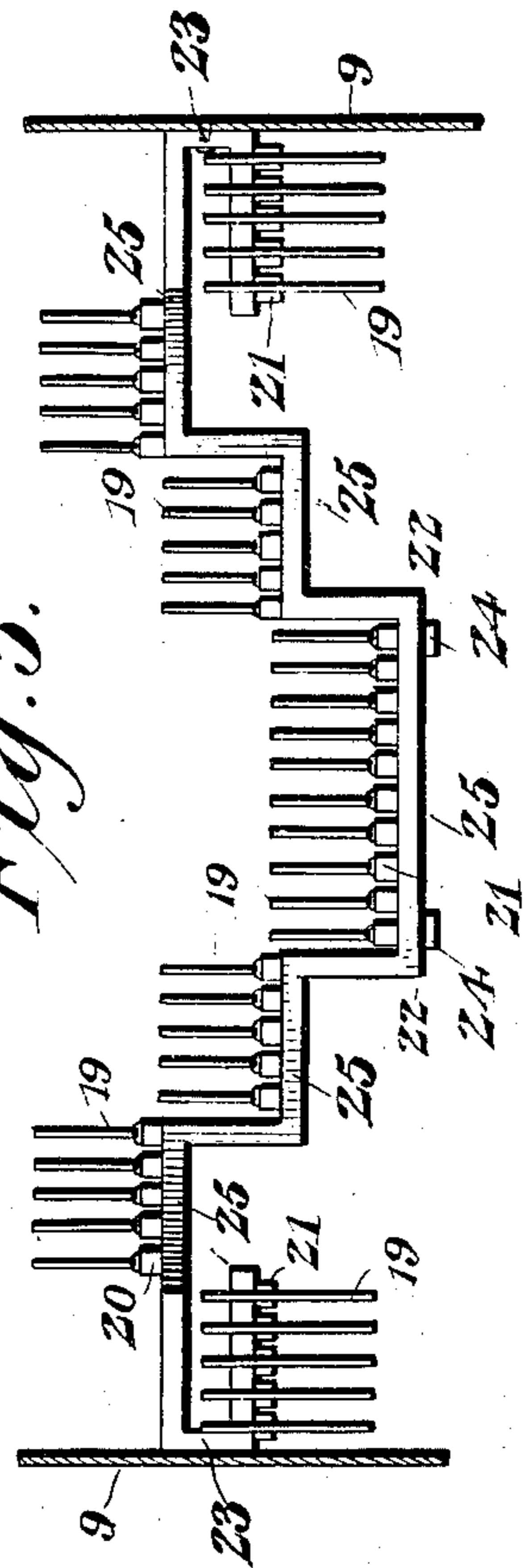


Fig. 5.



Witnesses
Jas. E. McLaughlin
D. P. Chapman

Harry S. Dukes,
By Inventor

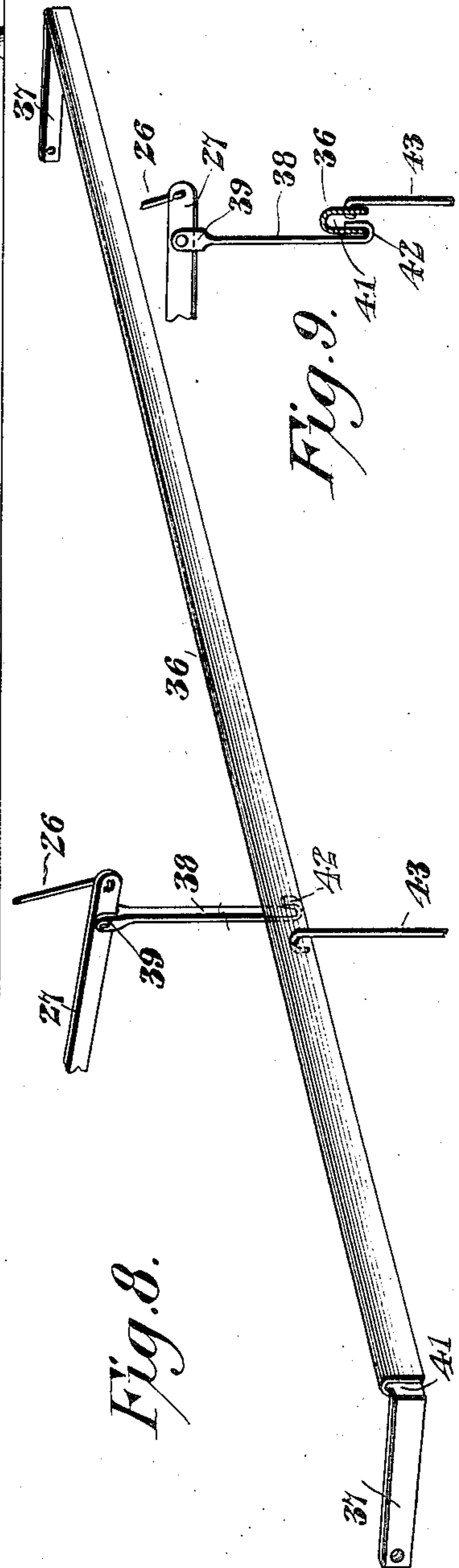
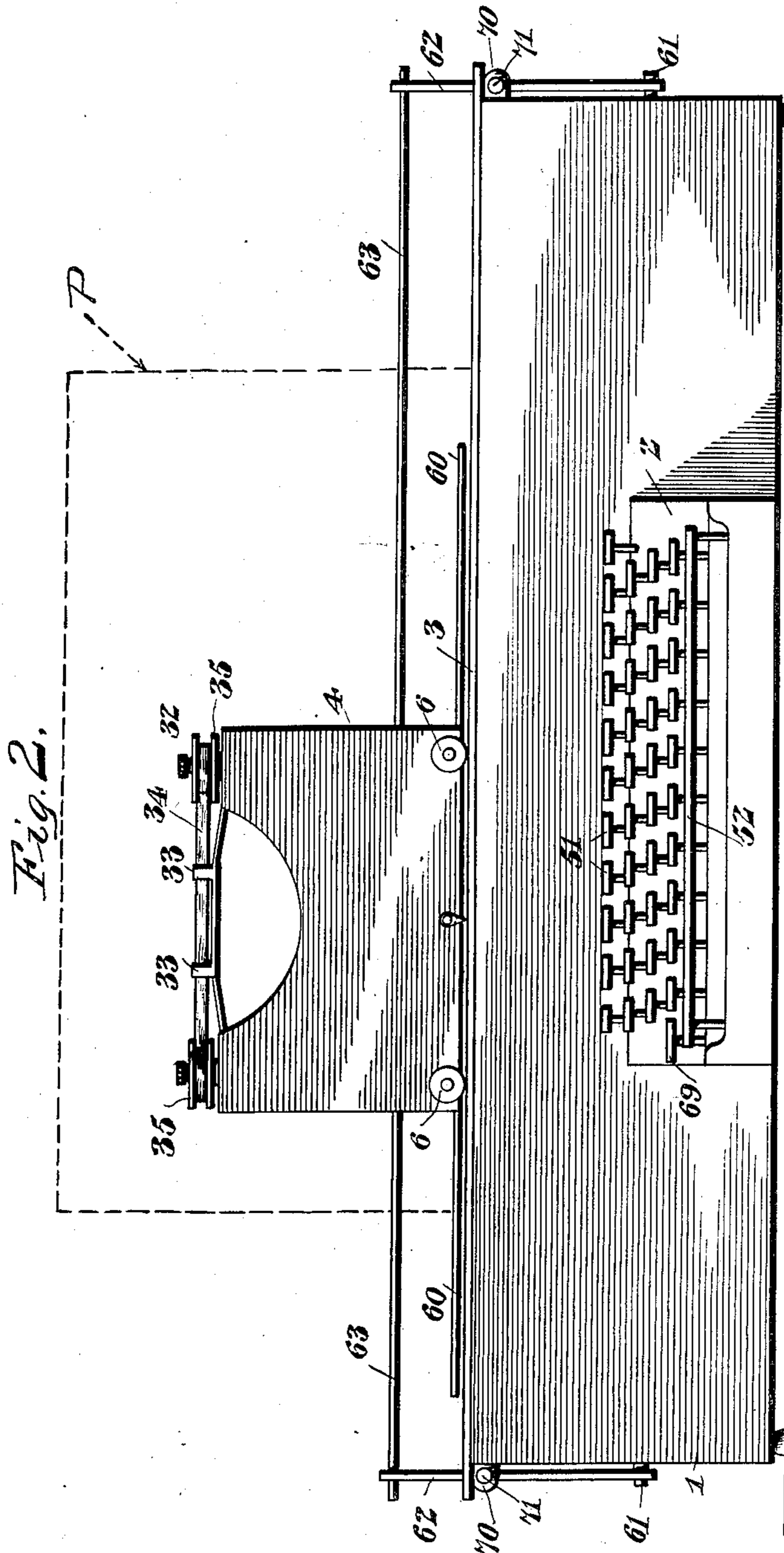
E. G. Siggers
Attorney

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6 SHEETS—SHEET 2.



Witnesses
Jas. E. McLathran
D. R. Haupt

Harry S. Dukes,
Inventor
By *E. J. Siggers*
Attorney

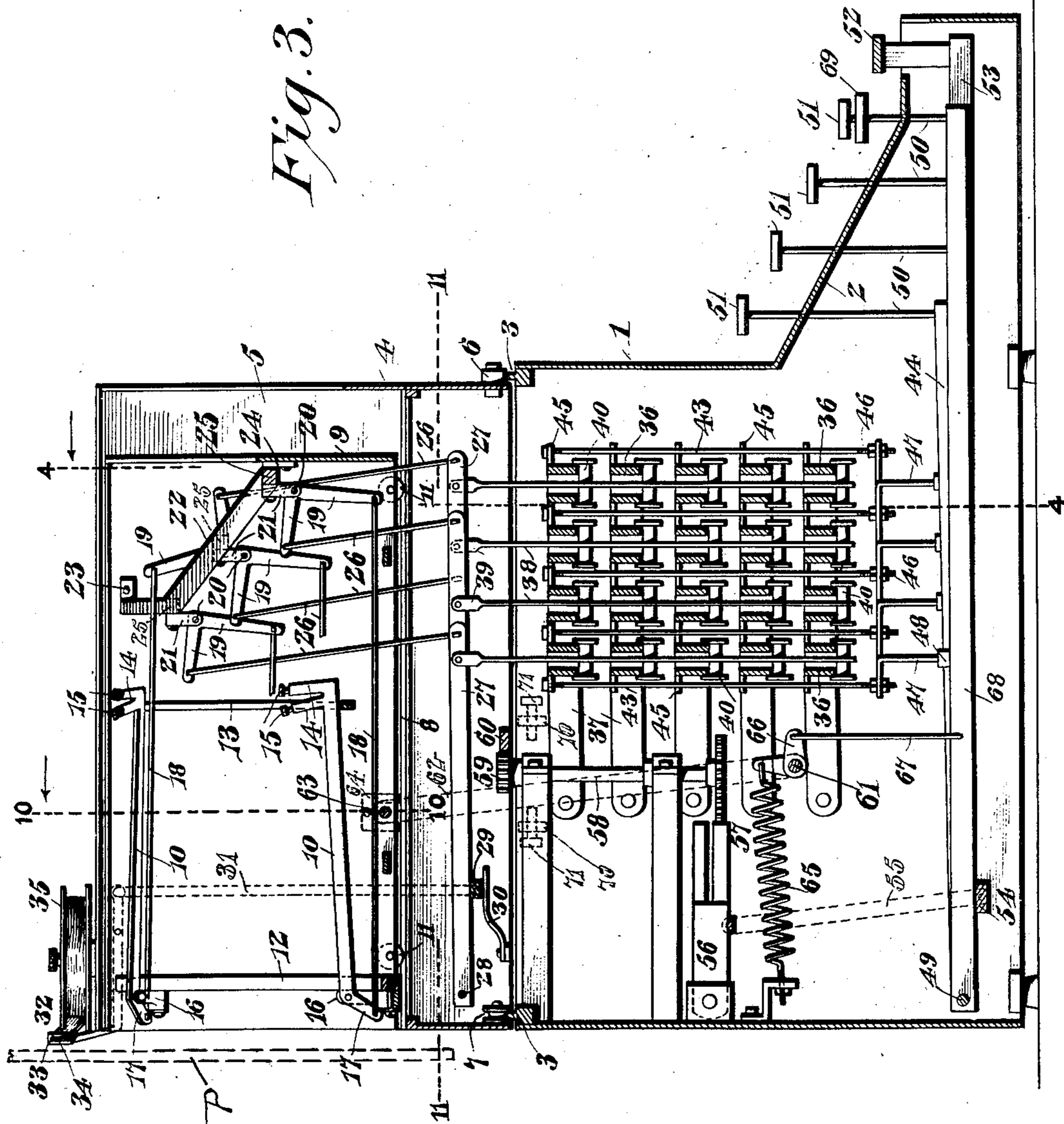
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VERTICAL PLANE TYPE WRITER.

APPLICATION FILED FEB. 1, 1900.

6 SHEETS—SHEET 3.



Harry S. Dukes

By

Inventor

Witnesses
Jas. E. McEachern
S. P. Hallam

E. G. Siggers
Attorney

No. 827,514.

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H. S. DUKES.
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6 SHEETS—SHEET 4.

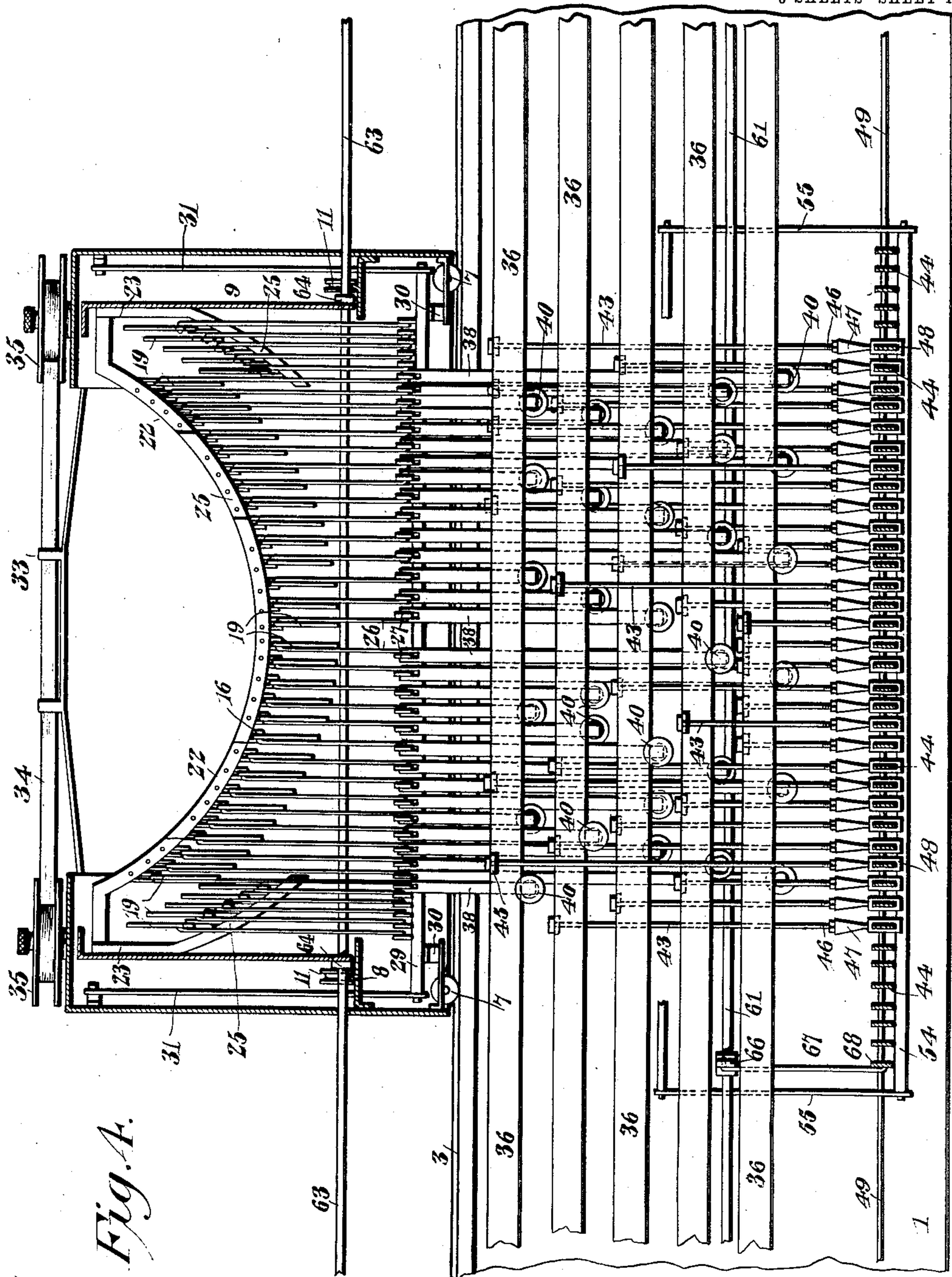


Fig. 4.

Harry S. Dukes,
Inventor

By

E. G. Siggers
Attorney

Witnesses
Jas. H. McLaughlin
D. R. McLaughlin

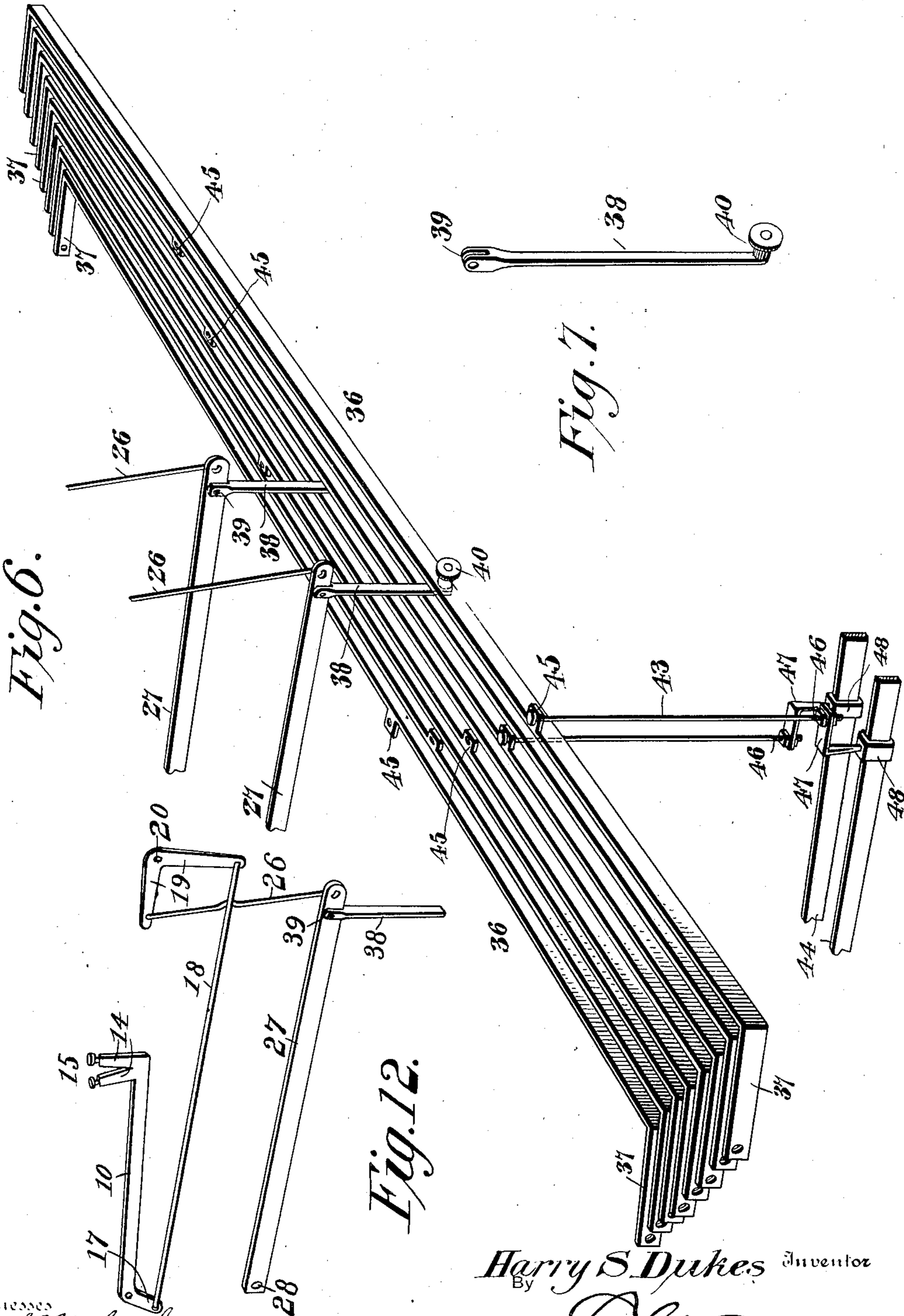
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APPLICATION FILED FEB. 1, 1900.

6 SHEETS—SHEET 5.



Witnesses
Jas. E. McClathran
D. P. Walchamper

Harry S. Dukes Inventor
By

E. G. Siggers
Attorney

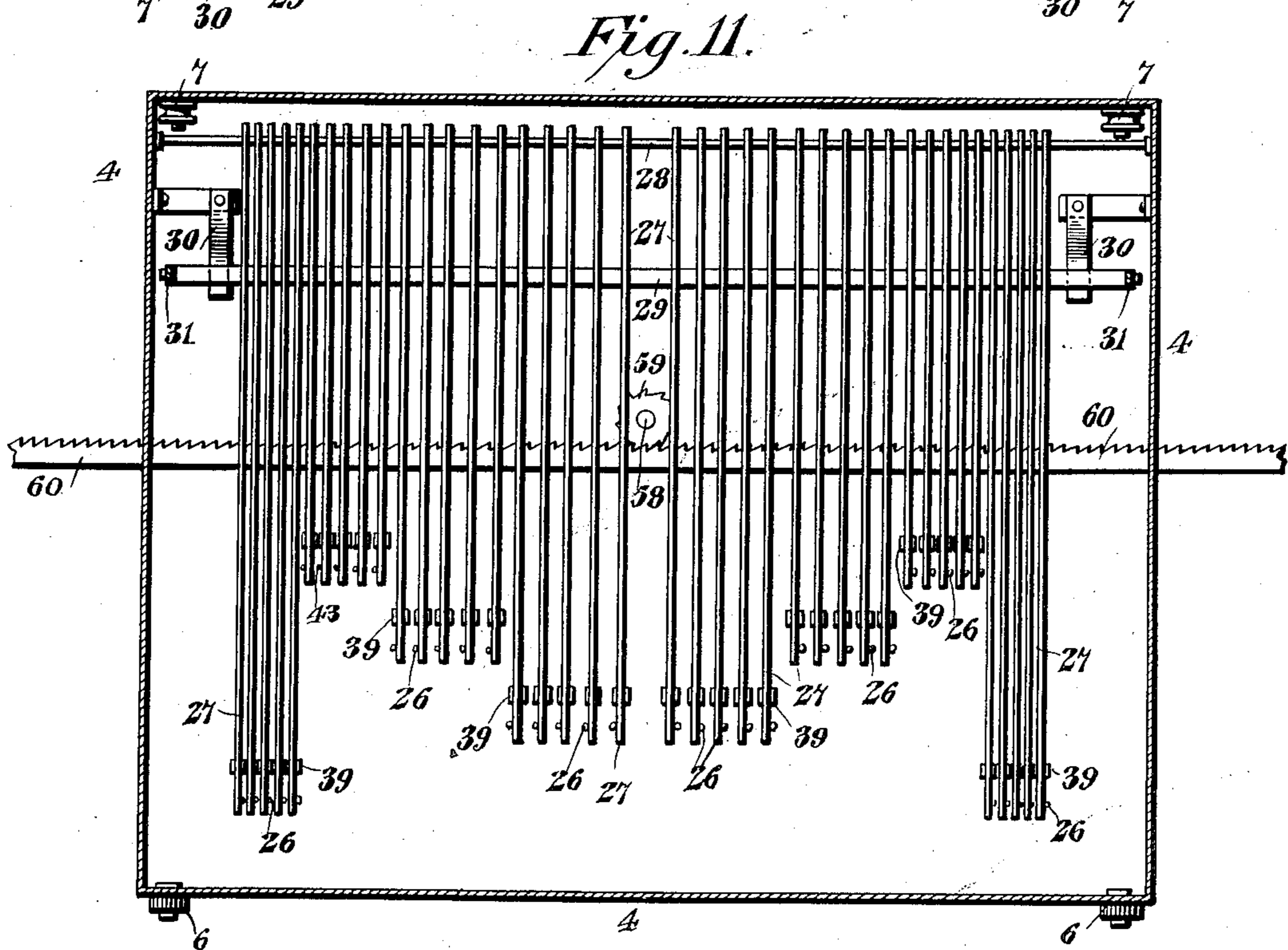
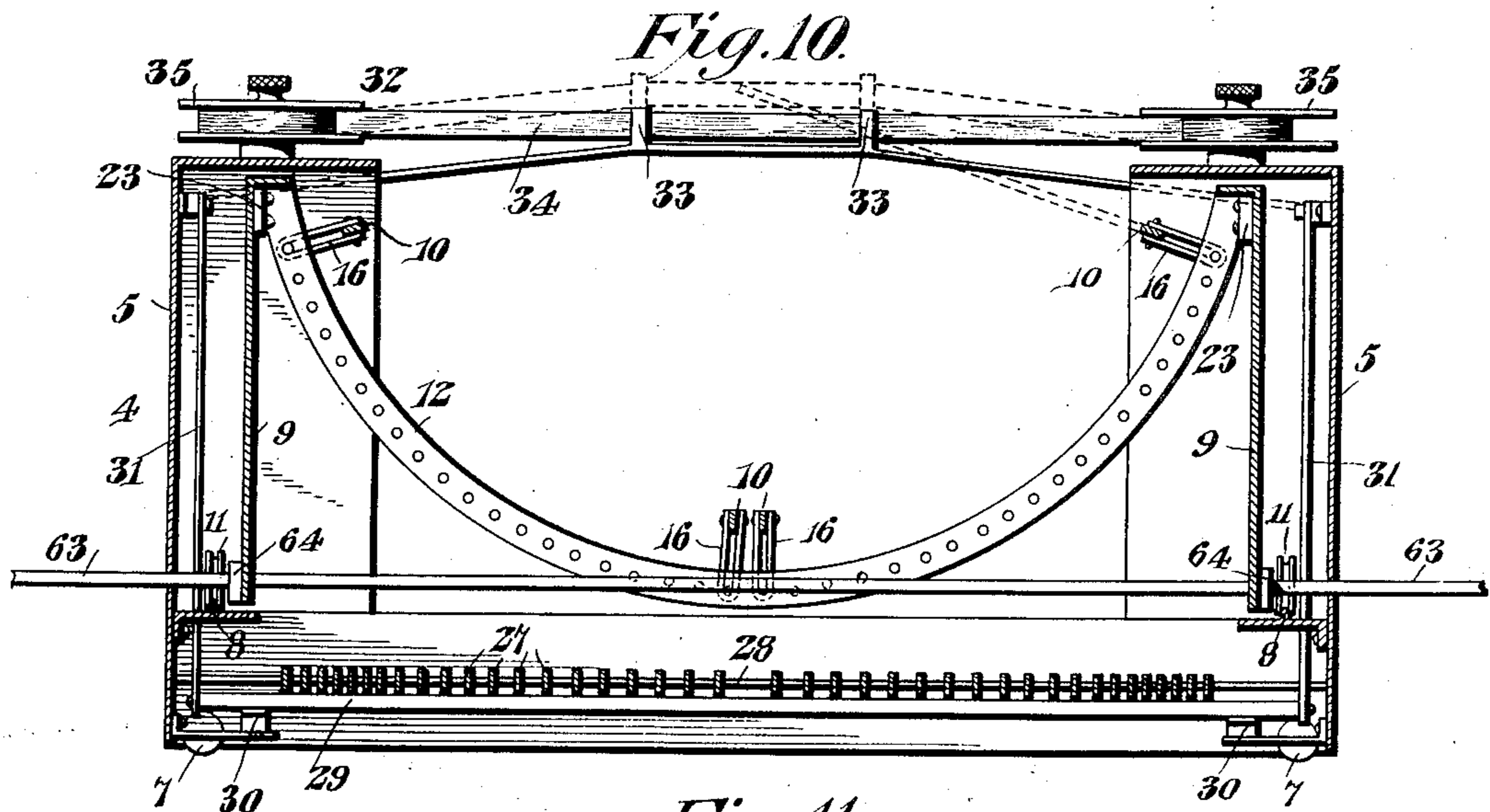
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PATENTED JULY 31, 1906.

H. S. DUKES.
VERTICAL PLANE TYPE WRITER.

APPLICATION FILED FEB. 1, 1900.

6 SHEETS—SHEET 6.



Harry S. Dukes,
Inventor

By

E. G. Siggers
Attorney

Witnesses
Jas. E. McLaughlin
L. J. W. Haupt

UNITED STATES PATENT OFFICE.

HARRY S. DUKES, OF LITTLE ROCK, ARKANSAS.

VERTICAL-PLANE TYPE-WRITER.

No. 827,514.

Specification of Letters Patent.

Patented July 31, 1906.

Application filed February 1, 1900. Serial No. 3,597.

To all whom it may concern:

Be it known that I, HARRY S. DUKES, a citizen of the United States, residing at Little Rock, in the county of Pulaski and State of Arkansas, have invented a new and useful Vertical-Plane Type-Writer, of which the following is a specification.

This invention relates to type-writing machines, and has special reference to an improved machine of this character having printing mechanism comprising means for operating upon work held in an upright position; and the invention also contemplates a type-writing machine so constructed as to be especially useful in printing upon the pages of books, although the same is adapted for printing upon sheets or any work held in such a way that the printing-point thereof will be intersected by a vertical plane.

In carrying out the foregoing object—that is, to provide a writing mechanism adapted for printing upon sheets or any work held in such a way that the printing-point is intersected by a vertical plane—the invention contemplates a simple, effective, and thoroughly-practical type-bar action embodying an arrangement of parts insuring completely-visible writing. A further object in this connection is to provide a novel arrangement of operating connections for the type-bars possessing special utility in connection with that class of machines known as “front-strike writing-machines,” wherein the type-bars strike rearwardly upon the front of the platen irrespective of whether this platen is in the conventional roller form or is of the flat type used in record and equivalent machines. This part of the invention not only secures compactness and simplicity in the type-bar action, but also provides for maintaining a uniformity of leverage throughout the entire action, as well as providing for the desirable feature of visibility of the writing.

A further object of the invention is to obviate the objection to book and similar type-writing machines which have a traveling keyboard, which in some forms of machines not only moves transversely with reference to the sitting position of the operator, but also toward and from the operator. This traveling keyboard is quite objectionable, for the reason that it not only renders the machine more inconvenient and difficult of manipulation, but also greatly impairs the speed of the operator. To overcome this difficulty, the present invention contemplates the em-

ployment of a stationary keyboard which always maintains a fixed relation to the operator and to associate with this stationary keyboard a traveling type-bar action carried by the type-carriage.

Another object of the invention is to effect a constant operative connection between the traveling type-bar action and the stationary key-action, which will permit of the uniform and positive operation of the type-bar action irrespective of the position of the traveling type-carriage, thus insuring the necessary accuracy of movement for the type-bars.

The invention also has in view many other objects besides those stated, which will hereinafter more readily appear as the same is better understood; and the invention consists in the novel construction, combination, and arrangement of parts hereinafter more fully described, illustrated, and claimed.

The fundamental features of the invention involving the structural features of the type-action, the stationary keyboard or key-action, and the traveling type-carriage, together with the constant operative connection between the said type-bar action and key-action, are necessarily susceptible to a wide range of modification and to various adaptations in different forms of machines without departing from the spirit of the invention; but a preferred adaptation of the principal instrumentalities of the invention is shown in the drawings, in which—

Figure 1 is a plan view of a type-writing machine embodying the features contemplated by the present invention. Fig. 2 is a front elevation of the machine shown in Fig. 1. Fig. 3 is a vertical transverse sectional view of the complete machine. Fig. 4 is a vertical longitudinal section on the line 4-4 of Fig. 3. Fig. 5 is a diagrammatic plan view of the lever-supporting bracket, showing the relative positioning of the separate sets of operating-levers for the type-bars. Fig. 6 is a detail in perspective of one horizontal series of the motion-transmitting elements or rails of the key-action, including a few connections for the type-action-connecting levers and for the key-levers. Fig. 7 is a detail in perspective of one of the coupling-rods associated with each type-action-connecting lever. Fig. 8 is a detail in perspective showing a modified form of motion-transmitting element or rail and a modification of the coupling-rod connection therewith. Fig. 9 is a

detail sectional view of the modification shown in Fig. 8. Fig. 10 is a vertical sectional through the type-carriage and the type-basket therein on the line 10 10 of Fig. 3. Fig. 11 is a horizontal sectional view on the line 11 11 of Fig. 3 immediately above the series of type-action-connecting levers. Fig. 12 is a fragmentary perspective view of the type-action for one of the individual type-bars, showing the relative planes of the operating connections.

Like numerals of reference designate corresponding parts in the several figures of the drawings.

In carrying out the present invention the essential feature thereof resides in the arrangement of the type-action in such relation to the key-action that the type-action is permitted to have a traveling movement with the carriage, while the key-action retains a relatively stationary position with reference to the type-action and to the operator, thus permitting of the employment of a stationary keyboard. This relation of the type-action to the key-action necessitates the provision of a constant operative connection between the two actions, whereby the type-bars may be uniformly operated with the carriage in any position, and while this combination of instrumentalities may be effected by different mechanical expedients still a practical way of carrying out the invention is shown in the drawings, and particular reference will now be made thereto.

The parts constituting the key-action and the stationary keyboard are associated with a stationary base, (designated by the numeral 1,) and in the type of machine shown in the drawings this base is preferably in the form of a casing which provides for housing the working parts of the key-action. The base may therefore be properly termed a "base-casing" and is of a generally rectangular configuration, being of a sufficient length to accommodate the traveling movement of the type-carriage. The said base-casing 1 is provided at the front side thereof and centrally between its ends with a forwardly-extending keyboard projection or case 2, above which is arranged the stationary keyboard, consisting of the keys hereinafter referred to. The said base-casing is also open at the top throughout the entire length thereof and has fitted to the upper side thereof a pair of oppositely-arranged track-rails 3. The track-rails 3, which are located at the top of the base 1, are disposed in parallel relation respectively at the front and rear sides of the base and extend longitudinally of the latter the full length thereof to accommodate the movement of the traveling type-carriage 4. The traveling type-carriage 4 essentially consists of a casing 5, within which are housed the working parts of the type-action, to be presently referred to, and the said casing is pro-

vided with the front and rear traveler-rollers 6 and 7, which travel, respectively, on the front and rear rails 3, the rear traveler-roller 7 being preferably peripherally grooved to take over the rear track-rail and prevent transverse displacement of the carriage from the track.

The type-carriage casing 5 is open at the bottom to communicate with the interior of the base 1 in all positions of the carriage. Within the carriage-casing is arranged a pair of horizontal track-rails 8, which track-rails are sustained in place by means of suitable supports and are disposed transversely of the carriage and at right angles to the longitudinal disposition of the main track-rails 3 for the carriage, the said interior transversely-disposed track-rails 8 within the carriage being designed for the support of the horizontally-movable shiftable type-bar carrier 9, which has a shifting movement transversely within the type-carriage for the purpose of effecting the printing of upper or lower case characters, as will hereinafter appear. The shiftable type-bar carrier 9 essentially consists of a skeleton rectangular frame provided with supporting-rollers 11, riding upon the stationary track-rails 8, which are supported inside of the type-carriage, and the said skeleton frame of the carrier not only provides for the support and horizontal movement of the type-basket, but also provides for the support of the elements having direct connection with the type-bars, thus providing for supporting and housing within the shiftable type-bar carrier nearly the entire type-action.

The type-basket, which is supported within and carried by the shiftable type-bar carrier 9, essentially consists of the vibratory or swinging type-bars 10 and the upright type-bar hanger and rest-rings 12 and 13, respectively, said rings being of the usual arched or semicircular form and the type-bars 10 grouped in a circular series within the rings to complete the type-basket. To provide for causing the type to print upon a vertical plane, it is necessary to have the type-bars normally lying in substantially horizontal positions, while the hanger and rest-rings 12 and 13 are disposed in vertical or upright positions and arranged in parallel-spaced relation, as clearly shown in Fig. 3 of the drawings. The upright arched rest-ring 13 is arranged in an intermediate position between the type-bar hanger-ring 12 and the front side of the type-bar-carrier frame and subserves the usual function of a rest or support for the swinging ends of the type-bars 10 when the latter are in their at-rest positions, while the upright hanger-ring 12, which is disposed at or near the rear side of the type-bar-carrier frame, provides for the support of the hangers on which the type-bars are pivotally mounted.

It will thus be seen that provision is made

for arranging the type-basket within the frame of the type-bar carrier in a horizontal position in contradistinction to the upright position of the type-basket in those machines in which the type strike downwardly upon a horizontal plane. By reason of the horizontal arrangement of the type-basket within the shiftable type-bar carrier a clear view may be obtained longitudinally through said basket by simply constructing the carriage-casing 5 at the front and rear sides thereof with openings, and inasmuch as the carriage-casing is also necessarily open at the top to accommodate the throw or swing of the type-bars an unobstructed view is had through and over the type-basket upon the writing-plane, thus insuring visible writing.

Each of the swinging type-bars 10 is provided at the free swinging end thereof with a pair of laterally-offset divergently-disposed type-carrying arms 14, to which are fitted the type or type-heads 15, whose printing-faces are disposed at an angle to each other and either of which type or type-heads is adapted to be placed in the printing position by shifting the fulcrum of the type-bar toward or from the printing-plane in the manner to be presently explained. The type-bars 10, which are provided with a pair of type having their printing-faces disposed at an angle to each other, are pivotally supported by the type-bar hangers 16, applied in a circular series upon the upright arched hanger-ring 12 and contiguous to their pivotal supports on the hangers 16, which are fitted to the ring 12. Each of the swinging type-bars 10 is provided with the usual angularly-projecting heel 17, to which is pivotally connected one end of the connecting-rod 18, which extends longitudinally within the frame of the shiftable type-bar carrier and is pivotally connected at its other end to one arm of an operating-lever 19, preferably in the form of a bell-crank and pivotally supported at its angle, as at 20, on the bearing-hanger 21, fitted to a lever-supporting bracket 22, mounted within the front portion of the shiftable type-bar-carrier frame and in advance of the type-basket.

There is a bell crank-operating-lever 19 and a rod connection 18 for each swinging type-bar, and in order to secure a compact arrangement of the several bell-crank levers 19 and their proper relative positioning with reference to the key-action element with which they are associated the lever-supporting bracket 22 is preferably of the peculiar construction plainly shown in Figs. 3 and 5 of the drawings. This supporting-bracket 22 is arched from side to side of the shiftable type-bar carrier 9 to conform approximately to the curvature or arching of the type-bar hanger-ring, whereby all of the type-bar-operating levers 19 may be disposed in vertical planes in parallel relation to each other, as

shown in Fig. 4 of the drawings, thus providing means for securing a direct pull upon the heel ends of the type-bars 10 by a downward pull upon the horizontally-disposed arms of said levers 19. This secures a direct and positive movement of each type-bar without any lateral strain on the pivots thereof. In addition to being transversely arched within the shiftable type-bar carrier 9 the lever-supporting bracket 22 is preferably constructed of a single bar, which may be suitably fastened at its end portions, as at 23, to the sides of the type-bar-carrier frame, and at an intermediate portion, as at 24, to the front of the type-bar-carrier frame, and thereby provide for firmly bracing the said bracket in its fixed position within the front portion of the shiftable type-bar carrier. To provide for the proper support of the bell-crank levers 19 in separate groups, the said lever-supporting bracket 22 is constructed with a series of offsets forming a plurality of hanger-bar portions 25, to which the bearing-hangers 21 for the bell-cranks are fastened. The several hanger-bar portions 25 of the bracket necessarily have the curvature of the bracket and are disposed in concentric relation, but in different vertical parallel planes, and those hanger-bar portions 25 which lie in the same circular and the same vertical plane provide for the support of those bell-crank levers which belong to the same group. It will therefore be seen that certain bell-crank levers 19 belonging to the same group and lying in the same vertical plane are arranged, respectively, at opposite sides of the transverse center of the bracket, as plainly shown in Fig. 5 of the drawings. Furthermore, the proper grouping and arranging of the bell-crank levers 19 is provided for by having the lever-supporting bracket laterally inclined to dispose the concentrically-arranged hanger-bar portions 25 in different horizontal planes, as plainly shown in Fig. 3 of the drawings. Also it may be found necessary or convenient in the compact grouping of the bell-crank levers 19 to reverse the position of some levers with reference to the others, whereby certain levers will have the rods 18 connected with the pendent arms thereof, and vice versa, such reverse arrangement of levers being also shown in Fig. 3.

From the foregoing it will be observed that the maintenance of a uniformity of leverage throughout the type-action and also the permanent relation of the several parts of the type-action are preserved by mounting the intermediate bell-cranks 19 upon a support separate from the hanger-ring, but shiftable therewith in the shifting movement of the type-bar carrier for effecting upper and lower case printing. Furthermore, it will be observed that in the arrangement described there is employed what may be properly termed a "plurality" of sets or rows of inter-

mediate bell-cranks connected to the type-bars and key-levers, one set being arranged forwardly of another and each set or row extending transversely of the machine.

5 Each of the type-bar-operating levers or bell-cranks 19, which are mounted within and shiftable with the type-bar carrier 9, has a pull-rod connection 26 with one end of a vertically-swinging type-action-connecting
10 lever 27, arranged within the lower portion of the traveling type-carriage below the plane of the shiftable type-bar carrier therein. There is of course the same number of type-action-connecting levers 27 as there are bell-
15 cranks 19 within the type-bar carrier, and the said connecting-levers 27 are preferably in the form of straight bars pivotally supported at one end, as at 28, in a common pivot-plane within the carriage-casing contiguous to the
20 rear side thereof. The straight connecting-levers 27 are arranged in parallelism in a common horizontal plane, but are necessarily of different lengths to provide for being properly connected with the bell-crank levers 19 and
25 also with the key-action within the stationary base 1; but it will be understood that inasmuch as the said levers 27 are arranged within the type-carriage and travel therewith the same necessarily constitute parts or elements
30 of the traveling type-action in contradistinction to the fixedly-positioned elements of the key-action within the stationary base 1. However, it will be observed that as far as the type-bar action *per se* is concerned the levers
35 27 are, in effect, the key-levers; inasmuch as they are linked directly to the keys through the intervening connections with the other key-levers 44, to be referred to.

By reason of the arrangement of the type-
40 action-connecting levers 27 in a common horizontal plane the vertical movement or swing of these levers can be utilized for transmitting motion to the ribbon feeding and shifting mechanism which may be associated with
45 the machine. To accomplish this result in a simple and practical way, there may be employed a universal bar 29, extending beneath the entire series of type-action-connecting levers 27 and normally held under pressure
50 against the levers by suitable return-springs 30, secured fast at one end to suitable points of attachment within the traveling type-carriage and having their free ends exerting a pressure against the universal bar 29.
55 The said return-springs 30 not only provide for normally readjusting the type-action-connecting levers 27 and the elements associated therewith to normal position, but also serve to assist in returning the type-bars to their at-
60 rest positions, although said type-bars after being swung to a printing position will tend to resume their normal positions under the influence of gravity.

The universal bar 29 not only serves in
65 connection with the springs 30 to readjust

the parts in the manner explained to normal positions, but has operating-arms 31 connected thereto and rising therefrom upwardly within the carriage-casing, said operating-arms 31 having suitable operative connection
70 with the parts of the ribbon-movement 32, which movement includes ribbon-feeding mechanism and a shifting device for moving the ribbon to and from the printing-point; but as said ribbon-movement constitutes no
75 part of the present invention and any suitable type thereof may be associated with the herein-described improvements it is not deemed necessary to specifically describe and illustrate the same, although in Fig. 4 of the drawings
80 the ribbon-shifting device is indicated as an entirety by the number 33 and the ribbon by the number 34, said ribbon being carried by the spools 35, mounted on top of the casing of the traveling carriage. Of course it is impor-
85 tant in carrying out the invention in connection with type-bars which strike upon a vertical plane to have the ribbon disposed at the top of the carriage and at the rear side thereof, whereby the shifting device 33 will move the
90 intermediate printing portion of the ribbon in a vertical direction.

The key-action on account of being fixedly positioned within the stationary base or base-casing 1 can be properly termed a "station-
95 ary" key-action with reference to the traveling movement of the type-action, and said stationary or fixedly-positioned key-action has a plurality of compactly-arranged groups of key-action motion-transmitting elements
100 36; which elements through the medium of the connections hereinafter described provide means for transmitting motion to the individual type-bars of the type-action irrespective of the location of the traveling type-
105 carriage upon the rails of the base. The said key-action motion-transmitting elements 36 are preferably in the form of straight vertically-disposed rails extending longitudinally of the base 1 or of a length
110 commensurate with the full travel of the type-carriage and provided at their opposite extremities with right-angularly-disposed supporting-arms 37, which are loosely mounted
115 on pivots or pivot-pins fitted in the adjacent ends of the base or base-casing. When the key-action motion-transmitting elements or rails 36 are grouped in the relation shown in the drawings, the said elements or rails 36 of each horizontal series necessarily have
120 their terminal supporting-arms 37 disposed in staggered relation to permit of the pivotal support of all of the arms of said series at the ends of the base, thereby admitting of the elements or rails being of a length commensurate with the play of the carriage. The
125 staggered relation of the terminal supporting-arms 37 of the motion-transmitting elements or rails 36 of each horizontal series also provides for holding said elements or
130

rails of each horizontal series in the spaced parallel relation which is necessary to admit of the proper connections therewith in the manner to be presently explained.

5 There is one of the key-action motion-transmitting elements or rails for each operating-key and each type-bar, and to secure a practical and very compact arrangement of the motion-transmitting elements or rails 36
10 the same are not only grouped in independent horizontal series, but all of the said horizontal series are disposed in a common vertical plane, whereby the elements or rails 36 in the adjacent series will be vertically
15 alined in a common vertical plane. There may be any number of the motion-transmitting elements or rails 36 in each horizontal series thereof, and there may also be any number of horizontal series grouped one above
20 the other, according to the requirements of the particular machine; but by preserving the order shown in the drawings the connections with the operating-keys and with the type-action may be effected in a simple and
25 positive manner to insure the most direct transmission of motion from an individual operating-key to the particular type-bar associated therewith.

30 The parallel-spaced relation of the motion-transmitting elements or rails 36 in each horizontal series and the vertical alinement of said elements or rails in the adjacent horizontal series provides or leaves vertically-alined spaces throughout the several series
35 which are adapted to receive therein the coupling-rods 38, which provide an operative connection between the key-action motion-transmitting elements or rails and the type-action-connecting levers 27. Each
40 type-action-connecting lever 27 has pivotally connected thereto, as at 39, the upper end of one of the coupling-rods 38, the lower end of which coupling-rod has a slidable or traveling connection with the element or rail 36
45 associated therewith. This slidable or traveling connection between each coupling-rod 38 and the motion-transmitting element or rail 36, in connection with which it operates, may consist of any mechanical expedient
50 adapted for the purpose, but is preferably in the form of a flanged traveler-roller 40, offset laterally from the lower end of the rod 38 and engaging with the lower edge or under side of the motion-transmitting element or
55 rail 36. At this point it may also be observed that each coupling-rod 38 is preferably bifurcated at its upper end to insure a firm pivotal connection between the same and the type-action-connecting lever 27 to
60 prevent lateral strain of the connection.

It has already been explained that the essential feature of the combination between each type-action-connecting lever 27 and the key-action motion-transmitting element 36, associated therewith, is to provide a suitable

operative traveling connection between these parts, whereby the type-action-connecting lever will be positively and uniformly operated with the type-carriage in any position; but while the flanged traveler-roller 40 on the
70 coupling-rod 38 effects this result in a practical manner still the modification shown in Figs. 8 and 9 may be resorted to for the same purpose. This modification simply consists in constructing the element or rail 36 in a
75 folded flanged form to provide the same with a guideway 41, extending longitudinally from end to end thereof and slidably receiving therein the hook 42 at the lower
80 end of the coupling-rod 38. The hook 42 will freely slide in the guideway 41 of the element or rail 36 as the carriage is moved upon the supporting-rails therefor, and will therefore accomplish the same result as the construction previously described; but it will be
85 understood, as already stated, that other modifications of this part of the invention may be resorted to without departing from the spirit or scope thereof.

The specific grouping of the key-action
90 motion-transmitting elements or rails 36, as described, permits the coupling-rods 38 to be arranged in the vertical spaces running between the vertically-alined elements or rails, and each alternate vertical space receives
95 therein as many of the coupling-rods 38 as there are vertically-alined rails on both sides of such space, inasmuch as proper connection can be made with the rails by having the flanged traveler-rollers 40 of some rods projecting
100 laterally in one direction to engage with the rails at one side of the space and by having the flanged traveler-rollers 40 of the remaining coupling-rods of the same group projecting laterally in an opposite direction
105 to engage with the other rails at the opposite side of the same space, as plainly shown in Fig. 3 of the drawings; but it will of course be understood that this arrangement may be varied to suit the requirements of the particular machine being constructed without departing from the essential features of the connections already set forth. The remaining alternate vertical spaces running between
110 the vertically-alined elements or rails 36 are designed to accommodate or receive therein certain of the upright connecting-rods 43 for the key-levers 44. In the arrangement shown some of the connecting-rods 43 are necessarily arranged exterior to or outside of the vertical plane of the several series of motion-transmitting elements or rails 36 to provide
115 for the proper key connections with the front and rear vertically-alined elements or rails shown in Fig. 3 of the drawings. Each upright connecting-rod 43 has a connection with one of the motion-transmitting elements or rails 36, and while this connection may be effected in any practical manner the same preferably consists in fitting the upper ex-
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tremity of each rod 43 to an attaching-lug 45, projecting laterally from the rail 36 with which it is associated, and it will be noted that in order to secure the necessary clearance of the connections, as well as to provide for the proper coupling together of the different parts, the attaching-lugs 45 of some rails 36 project laterally in one direction, while those of the other rails project in an opposite direction, as shown in Figs. 3 and 6 of the drawings. The lower end of each connecting-rod 43 has an adjustable connection 46 with an angle-plate 47, arising from a clip or sleeve 48, fitted to the key-lever 44. The several key-levers 44 are grouped in a horizontal series within the bottom portion of the base or base-casing 1 and are pivotally supported at their rear ends, as at 49, in a common pivot-plane, the front ends of the key-levers having fitted thereto the lower ends of the vertical stems 50, extending through the front keyboard extension 2 of the base and carrying at their upper ends the operating-keys 51, which keys are arranged in the usual stepped order and constitute the stationary keyboard of the machine. The spacing-bar 52 of the keyboard is supported by levers 53, grouped with the other key-levers 44 and mounted in the same pivot-plane, and all of said levers are designed to actuate the letter-spacing mechanism of the machine. This may be conveniently accomplished in a practical manner by arranging beneath the entire series of key-levers a universal bar 54, having an operating connection 55 with the dog-carrying lever 56 of the letter-spacing mechanism 57, suitably mounted within the stationary base-casing. This letter-spacing mechanism may be of any approved type, but in the form shown in the drawings not only includes the dog-carrying lever 56, but the feed-shaft 58, carrying a pinion 59, meshing with a rack-bar 60, fitted to and carried by the traveling carriage 4. The said letter-spacing mechanism is necessarily actuated upon the movement of each operating-key or the space-bar 52, and therefore provides for the necessary movement of the carriage upon its supporting-track to effect the letter-spacing. In connection with the letter-spacing mechanism there is associated with the carriage any suitable actuating device, such as a spring-actuated drum 60^a, supported by the base, and the usual tape 60^b, winding and unwinding on the drum and having a connection with one end of the carriage, said parts being indicated in Fig. 1 of the drawings.

The line-spacing for the work is effected through the medium of a support which may be associated with the machine for holding the work in an upright position; but as this support forms no part of the present invention the same is not shown or described herein. This, however, is fully shown in my companion application, filed of even date

herewith, Serial No. 35,938; but the position of the platen is indicated by the dotted lines and the reference character P in Figs. 2 and 3.

It has already been explained that in order to effect the printing of upper and lower case characters it is necessary to shift the fulcrum of the type-bars 10 toward and from the vertical printing-plane, which shifting of the fulcrum is accomplished by the horizontal shifting movement of the type-bar carrier 9 within the traveling type-carriage, and while different means may be resorted to for securing the shifting movement of the type-bar carrier the mechanism or device illustrated in the drawings for this purpose may consist of a rock-shaft 61, mounted within the base and carrying the swinging adjusting-arms 62, extending upwardly above the base, and carrying at their upper ends the longitudinally-arranged shifting-rod 63, which has a slidable interlocking connection with the adjustable slotted lugs 64, fitted to the shiftable type-bar carrier. The shift-rod 63 compels the type-bar carrier to travel in a constant plane aside from the shifting movement thereof, and the slotted lugs 64 are adjustable, so as to be made to closely engage the shift-rod 63 without binding thereon. Suitable springs are associated with the shifting device or mechanism to normally hold the shiftable type-bar carrier in its closest position to the printing-plane, whereby the type-bars will normally strike lower-case characters, and said spring (designated by the numeral 65) may be conveniently attached to the rock-shaft 61 to exert a tension in a direction to provide for normally swinging the adjusting-arms 62 rearwardly, whereby the type-bar carrier will be normally maintained in the position described. Should it be desired to print upper-case characters, it is only necessary to shift the type-bar carrier forwardly within the type-carriage to move the fulcrum of the type-bars away from the printing-plane. This movement may be accomplished by providing the rock-shaft 61 with an arm 66, having a link connection 67 with the swinging lever 68 of the shift-key 69, said lever 68 being grouped with the horizontal series of key-levers 44 and the levers 53 for the spacing-bar of the keyboard.

In order to positively limit the shifting movement of the type-bar carrier 9 in either direction, suitable stops are associated therewith. The preferred arrangement of these stops is shown in the drawings and consists in arranging, respectively, at opposite sides of the swinging arms 62 the oppositely-located lugs 70, carrying adjustable stop-screws 71, which are adapted to be respectively engaged by the arms 62 when thrown either forward or backward, said lugs 70 being projected from the stationary base, so as to occupy fixed positions. The said stop-

screws 71 not only serve in the capacity of limiting-stops to limit the swing of the adjusting-arms 62 for the type-bar carrier, but also provide simple and reliable means whereby the alinement of the type may be regulated.

From the foregoing it is thought that the construction, operation, and many advantages of the herein-described machine will be readily apparent to those familiar with the art without further description, and inasmuch as the fundamental features of the invention herein pointed out are necessarily susceptible to a wide range of modification and even susceptible to adaptation to different types of machines printing upon different planes I will have it understood that various changes in the form, proportion, and minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of the present invention.

Having thus described the invention, what is claimed as new, and desired to be secured by Letters Patent, is—

1. In a writing-machine, the combination with a platen, of a curved system of rearwardly-striking type-bars, the pivots of all of which type-bars are arranged in the same circle-line, a system of key-levers, and a plurality of sets or rows of intermediate levers connected with said type-bars and key-levers, one set being arranged forwardly of another, and each set or row extending transversely of the machine.

2. In a writing-machine, a shiftable type-bar carrier provided with a hanger-support for the type-bars and also with a separate support, both of said supports being shiftable with the carrier, and operating connections including intermediately-arranged angle-levers mounted on said separate support and operatively connected to the type-bars.

3. In a writing-machine a shiftable type-bar carrier provided with a stationary hanger-ring for the type-bars and a fixed support separate from said ring, both the latter and the fixed support being shiftable with the carrier, key-levers, and intermediately-arranged angle-levers mounted on the fixed support, each angle-lever having one arm connected to the heel of a type-bar and the other arm connected with a key-lever.

4. In a type-writing machine, the combination with a platen presenting a vertical printing-plane, of a horizontally-shiftable support, and rearwardly-striking type-bars carried by said support.

5. In a front-strike writing-machine, the combination with the platen, of a horizontally-shiftable type-bar carrier, rearwardly-striking type-bars carried by said carrier, key-levers, and intermediately-arranged angle-levers operatively connected with the type-bars and also with the key-levers.

6. In a type-writing machine, the combination of a platen, a system of swinging type-bars, a system of key-levers, and a plurality of sets of intermediate levers connected with the type-bars and key-levers, said intermediate levers being arranged in separate parallel series to maintain a similar leverage for all of the keys.

7. A type-writing machine having a stationary key-action, a type-bar action having a traveling movement in the direction of letter-spacing, and a separate restricted shifting movement independent of said traveling movement and providing for upper and lower case printing, and operative connections between the two actions.

8. A type-writing machine having a stationary key-action, a traveling type-action, including swinging type-bars and moved as an entirety by the letter-spacing action, and operative connections between said two actions.

9. A type-writing machine having a fixedly-positioned key-action, including a stationary keyboard, and a shiftable type-bar action operatively connected with the key-action and having a traveling movement as an entirety in the direction of letter and word spacing.

10. A type-writing machine having a fixedly-positioned key-action, including a stationary keyboard, and a movable type-action including swinging type-bars and operatively connected with the key-action, said type-action having a shiftable movement and also a traveling movement in the direction of letter and word spacing.

11. A type-writing machine having a fixedly-positioned key-action including a stationary keyboard, a movable type-bar action including swinging type-bars and having a traveling movement as an entirety in the direction of letter and word spacing, said type-bar action having an operative connection with the key-action.

12. A type-writing machine having a stationary key-action, a movable type-action including swinging type-bars and having a traveling movement in the direction of letter-spacing, said action also having a separate shifting movement for upper and lower case printing, and a constantly-maintained shiftable connection between the two actions.

13. A type-writing machine having a stationary key-action, including motion-transmitting elements, a traveling type-action having a traveling movement in the direction of letter-spacing, and a separate restricted shifting movement for upper and lower case printing, and a constantly-maintained shiftable operative connection between the type-action and the motion-transmitting elements of the key-action.

14. In a type-writing machine, a stationary key-action having a plurality of key-ac-

tuated motion-transmitting elements, a traveling type-action including swinging type-bars, and individual operating connections for each bar, the individual operating connections for each type-bar having a traveling operative connection with one of the motion-transmitting elements of the key-action said type-action having a travel in a constant plane, substantially as set forth.

15. In a type-writing machine, a stationary key-action having a plurality of key-actuated motion-transmitting elements, a traveling type-action including swinging type-bars, and individual operating connections for each type-bar having a constantly-maintained traveling operative connection with one of the motion-transmitting elements of the key-action, said type-action being shiftable for upper and lower case printing and also having a traveling movement in the direction of letter-spacing, substantially as described.

16. In a type-writing machine, the stationary key-action including a plurality of key-actuated motion-transmitting elements, a traveling type-action including swinging type-bars and type-action-connecting levers having individual connections with the type-bars, each of the said type-action-connecting levers having a shiftable or traveling operative connection with one of the motion-transmitting elements of the key-action said type-action having a travel in a constant plane, substantially as described.

17. In a type-writing machine, the stationary key-action including a plurality of key-actuated motion-transmitting elements, a traveling type-action including swinging type-bars and type-action-connecting levers having individual connections with the type-bars, each of the said type-action-connecting levers having a constantly-maintained shiftable or traveling connection with one of the motion-transmitting elements of the key-action said type-action having a travel in a constant plane solely in the direction of letter-spacing, substantially as described.

18. In a type-writing machine, the stationary key-action including a plurality of key-actuated motion-transmitting elements, a traveling type-action including pivotal type-bars and type-action-connecting levers having individual connections with the type-bars said type-action having a travel in a constant plane solely in the direction of letter-spacing, and a coupling-rod connected with each type-action-connecting lever and having a shiftable or traveling connection with the motion-transmitting element associated therewith, substantially as described.

19. In a type-writing machine, the stationary key-action including a plurality of key-actuated motion-transmitting elements, a traveling type-action including pivotal

type-bars and type-action-connecting levers having individual connections with the type-bars said type-action having a travel in a constant plane solely in the direction of letter-spacing, and a coupling-rod connected with each type-action-connecting lever, and having a constantly-maintained, shiftable or traveling connection with the motion-transmitting element associated therewith, substantially as described.

20. In a type-writing machine, the stationary key-action including a plurality of key-actuated motion-transmitting elements, a traveling type-action including pivotal type-bars and type-action-connecting levers having individual connections with the type-bars, and a coupling-rod pivotally connected with each type-action-connecting lever, said coupling-rod carrying a traveler having a traveling engagement with the key-action-motion-transmitting element associated with said lever, substantially as described.

21. In a type-writing machine, the stationary base, the stationary key-action, including a plurality of key-actuated rails extending longitudinally of the base, and a traveling type-action including swinging pivotal type-bars having traveling operative connections with the rails and moving in a constant plane in the direction of letter-spacing, substantially as described.

22. In a type-writing machine, the stationary base, the stationary key-action including a plurality of movable key-actuated rails extending longitudinally of the base, a traveling type-action including swinging type-bars and type-action-connecting levers having individual connections with the type-bars said type-action having a travel in a constant plane in the direction of letter-spacing, and coupling-rods connected with said type-action-connecting levers and carrying traveler-rollers engaging with the rails of the key-action, substantially as described.

23. In a type-writing machine, the stationary base, the stationary key-action including a plurality of movable key-actuated rails extending longitudinally of the base, each of said rails having individual pivotal supports, and the traveling type-action including swinging pivotal type-bars having traveling operative connection with the rails, substantially as described.

24. In a type-writing machine, the stationary base, the stationary key-action having a plurality of motion-transmitting rails, each provided with individual pivotally-sustained supporting-arms, and a traveling type-action having traveling operative connection with the rails of the key-action the said traveling type-action having swinging pivotal type-bars, substantially as described.

25. In a type-writing machine, the stationary base, the stationary key-action having a plurality of key-actuated motion-trans-

mitting rails arranged in separate horizontal series the rails of each horizontal series being disposed in spaced relation, and a traveling type-action provided with operative connections extending through the spaces between the rails and having a traveling engagement therewith, the said traveling type-action having swinging pivotal type-bars, substantially as described.

26. In a type-writing machine, the stationary base, the stationary key-action having a plurality of movable key-actuated motion-transmitting rails arranged in separate horizontal series, the rails of each horizontal series being disposed in spaced parallel relation, and those of adjacent series being arranged in vertical alinement to leave intervening vertically-alined spaces, a traveling type-action, and operative connections for the type-action extending through the vertical spaces between the rails and having traveling engagement therewith, substantially as described.

27. In a type-writing machine, the stationary base, the stationary key-action having a plurality of movable motion-transmitting rails arranged in separate horizontal series, the rails of each series being arranged in spaced parallel relation, and those in adjacent horizontal series being disposed in vertical alinement to leave intervening vertically-alined spaces, a traveling type-action including type-action-connecting levers having individual connections with the type-bars, coupling-rods for the type-action-connecting levers extending therefrom through certain of the vertical spaces between said motion-transmitting rails, and having operative traveling engagement therewith, and key-actuated connecting-rods extending through other of said vertical spaces and having operative engagement with said rails, substantially as described.

28. In a type-writing machine, the stationary base, the stationary key-action having a plurality of swinging motion-transmitting rails arranged in separate horizontal series, the rails of each horizontal series being arranged in spaced parallel relation, and those of adjacent horizontal series being disposed in vertical alinement to leave intervening vertically-alined spaces, a traveling type-action including type-action-connecting levers having individual connections with the type-bars, coupling-rods extending from the type-action-connecting levers through certain of the vertically-alined spaces between said rails and having operative traveling engagement with the latter, and key-actuated connecting-rods extending through other of said vertically-alined spaces between the rails and also operatively connected with the latter, substantially as set forth.

29. In a type-writing machine, a stationary base, a stationary key-action mounted

within the base, a traveling type-action supported for travel upon the base in the direction of letter and word spacing, and including swinging type-bars, and operative connections between the two actions, substantially as set forth.

30. In a type-writing machine, the base, the key-action mounted within a shift-key base and having a plurality of motion-transmitting elements, the traveling type-action including a series of type-action-connecting levers, swinging type-bars, type-bar-operating levers operatively connected with the type-bars and the said type-action-connecting levers said type-action being supported upon the base for travel in a constant plane, and coupling-rods operatively connecting the type-action-connecting levers with the motion-transmitting elements of the key-action, substantially as described.

31. In a type-writing machine, the base, the key-action mounted within the base and having a plurality of motion-transmitting elements, the traveling type-action including a series of type-action-connecting levers, swinging type-bars, type-bar-operating levers operatively connected with the type-bars and the said type-action-connecting levers, and coupling-rods operatively connecting the type-action-connecting levers with the motion-transmitting elements of the key-action, said type-bar-connecting levers, the type-bar-operating levers, and the coupling-rods being grouped in corresponding series, substantially as described.

32. In a type-writing machine, the base, the key-action mounted within the base, and the traveling type-action including type-action-connecting levers operatively connected with the key-action, pivotal type-bars, and a plurality of type-bar-operating levers connected respectively with the type-bars and said type-action-connecting levers, the said type-bar-operating levers being grouped in separate series disposed in different vertical and different horizontal planes, substantially as described.

33. In a type-writing machine, the base, the key-action mounted within the base, and the traveling type-action including type-action-connecting levers operatively connected with the key-action, pivotal type-bars, and a plurality of type-bar-operating levers connected respectively with the type-bars and said type-action-connecting levers, the said type-bar-operating levers being grouped in separate series arranged in parallel concentric relation, substantially as described.

34. In a type-writing machine, the base, the key-action mounted within the base, and the traveling type-action including type-action-connecting levers operatively connected with the key-action, pivotal type-bars, and a plurality of type-bar-operating levers connected respectively with the type-bars and

said type-action-connecting levers, the said type-bar-operating levers being grouped in several series arranged in parallel planes and also disposed in different horizontal planes, substantially as described.

35. In a type-writing machine, the base, the key-action within the base, the traveling type-carriage, a lever-supporting bracket arranged within the carriage and having a plurality of offsets forming a number of separate hanger-bar portions disposed in separate parallel vertical planes, and a type-action mounted within and movable with the carriage, the said type-action including swinging pivotal type-bars and type-bar-operating levers supported from the separate hanger-bar portions of the bracket, substantially as described.

36. In a type-writing machine, the base, the key-action, the traveling type-carriage, the arched type-basket within the carriage, the lever-supporting bracket arranged within the carriage and arched to conform with the arching of the type-basket, said lever-supporting bracket being provided with a plurality of separate hanger-bar portions disposed in parallel vertical planes, and a type-action mounted within and movable with the carriage, and including type-bar-operating levers supported from the hanger-bar portions of the supporting-bracket and operatively connected respectively with the type-bar and the key-action, substantially as described.

37. In a type-writing machine, the base a stationary key-action, the traveling type-carriage mounted upon the base, and a horizontally-shiftable type-bar carrier supported by the carriage and carried by the latter solely in the direction of letter-spacing, said type-bar carrier carrying swinging type-bars, each of which has type whose printing-faces are disposed at an angle to each other, substantially as described.

38. In a type-writing machine, the base, a traveling type-carriage mounted upon the base, and a horizontally-movable type-bar carrier supported by the carriage and shiftable toward and from a vertical printing-plane, said type-bar carrier carrying vibratory type-bars, each of which is provided with type whose printing-faces are disposed at an angle to each other, substantially as described.

39. In a type-writing machine, the base a stationary key-action, the traveling carriage mounted upon the base and movable thereon in the direction of letter-spacing, a horizontally-movable type-bar carrier supported by the carriage and shiftable transversely therein toward and from a vertical printing-plane

and the type-action including swinging type-bars carried by said carrier, substantially as described.

40. In a type-writing machine, the base a stationary key-action, the type-carriage arranged to travel longitudinally of the base and movable thereon in the direction of letter-spacing, a horizontally-movable type-bar carrier supported by the carriage, and shiftable toward and from a vertical printing-plane, and in a direction at right angles to the traveling movement of the type-carriage and the type-action including swinging type-bars carried by said carrier, substantially as described.

41. In a type-writing machine, the combination with the traveling type-carriage having openings at the front and rear thereof, of an arched type-basket arranged horizontally within the carriage in the transverse plane of the openings at the front and rear thereof to expose the writing therethrough, substantially as described.

42. In a type-writing machine, the stationary keyboard including a shift-key, a traveling type-carriage movable in a constant plane in the direction of letter-spacing, a shiftable type-bar carrier supported by the traveling type-carriage, and a constantly-maintained operative connection between the shiftable type-bar carrier and the shift-key of the stationary keyboard and the type-action including swinging type-bars carried by said carrier, substantially as described.

43. In a type-writing machine, the combination of the stationary base, a stationary key-action, a traveling type-carriage, a shiftable type-bar carrier supported by the carriage having a travel in a constant plane in the direction of letter-spacing, and the traveling type-action movable with the carriage and traveling in the same constant plane and operatively connected with the stationary keys said type-action including swinging type-bars, substantially as described.

44. In a type-writing machine, the combination of a set of front-strike pivoted type-bars, a system of parallel sublevers, a set of parallel key-levers, a set of parallel key-actuated levers, connections between the type-bars and sublevers, connections between the key-levers and said key-actuated levers, and connections between the key-actuated levers and said sublevers.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

HARRY S. DUKES.

Witnesses:

JOHN H. SIGGERS,
EDWIN E. VROOMAN