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PATENTED MAY 1, 1906.

H. A. MOYER & E. G. LATTA.
TYPE WRITING MACHINE.

APPLICATION FILED APR. 28, 1905.

2 SHEETS—SHEET 1.

Fig. 1

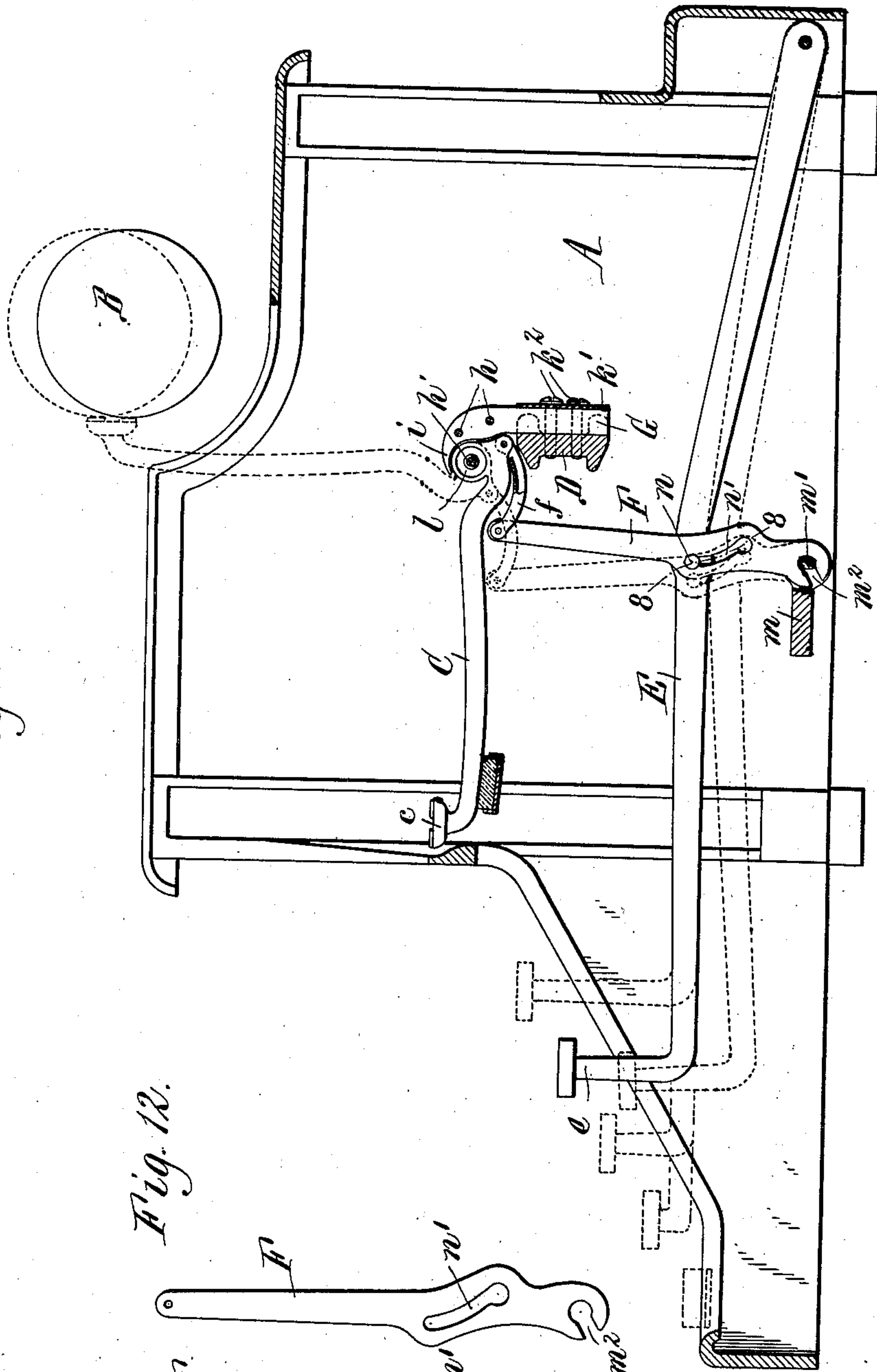


Fig. 11.

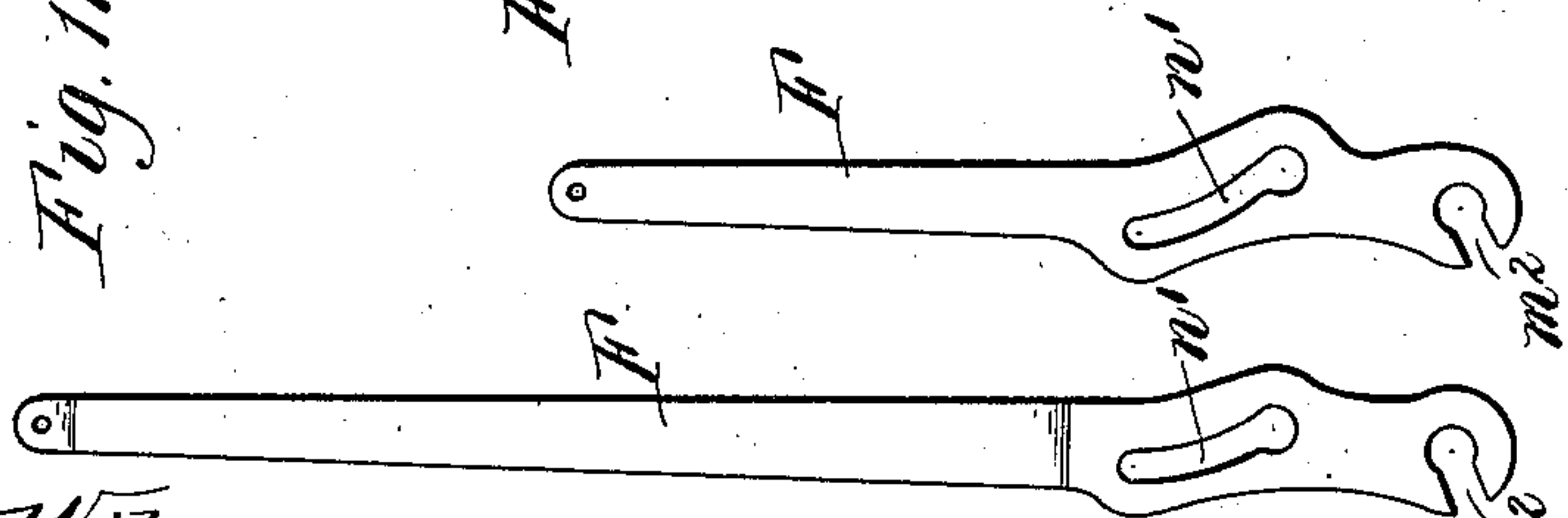


Fig. 12.

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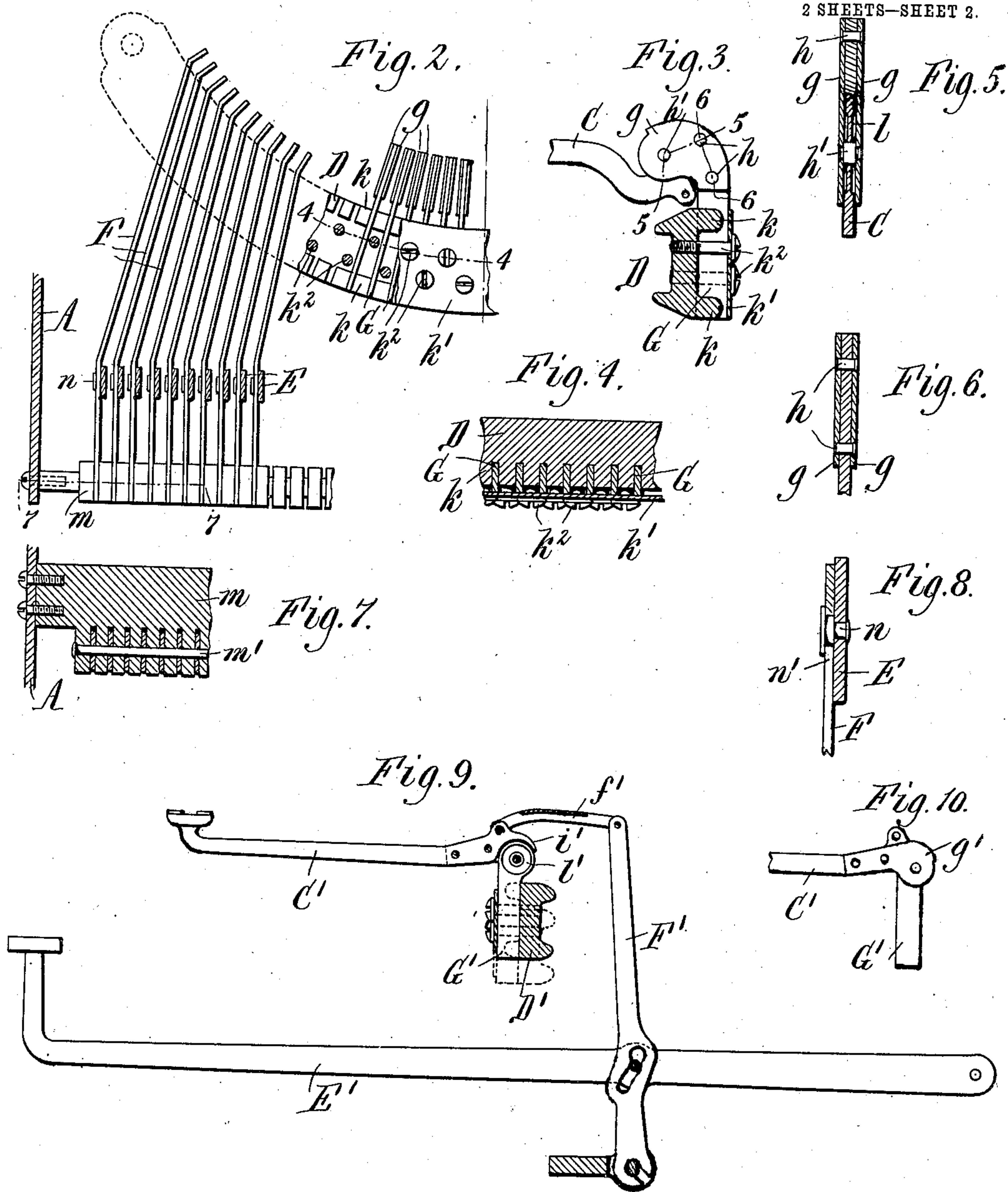
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2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

HARVEY A. MOYER AND EMMIT G. LATTA, OF SYRACUSE, NEW YORK.

TYPE-WRITING MACHINE.

No. 819,365.

Specification of Letters Patent.

Patented May 1, 1906.

Application filed April 28, 1905. Serial No. 257,841.

To all whom it may concern:

Be it known that we, HARVEY A. MOYER and EMMIT G. LATTA, citizens of the United States, residing at Syracuse, in the county of Onondaga and State of New York, have invented a new and useful Improvement in Type-Writing Machines, of which the following is a specification.

This invention relates to type-writing machines, and more particularly the type-bar actions for front-strike type-writing machines in which the type-bars are pivotally supported below the platen and swing upwardly and rearwardly to make the impressions at the front side of the platen, where the writing is exposed to the view of the operator while using the machine.

One object of the invention is to produce a desirable type-bar action of simple, economical, and durable construction which insures a light touch and easy movement and in which the finger-keys have a uniform dip and equal leverage, while the type-bars may have an accelerating movement toward the printing-point.

Another object of the invention is to improve the construction of the bearings or hangers for the type-bars.

In the accompanying drawings, consisting of two sheets, Figure 1 is a longitudinal sectional elevation of so much of a type-writing machine embodying the invention as is necessary to an understanding thereof. Fig. 2 is a rear elevation, partly in section, of a portion of the type-bar segment and hangers and also showing a portion of the key-levers, the auxiliary levers, and their pivotal bearings. Fig. 3 is a fragmentary sectional elevation, on an enlarged scale, of one of the type-bars, its hanger, and the supporting-segment. Fig. 4 is a fragmentary section in line 4 4, Fig. 2, of the type-bar segment and hangers. Fig. 5 is an enlarged sectional elevation in line 5 5, Fig. 3, showing the type-bar pivotal bearing. Fig. 6 is an enlarged sectional elevation of one of the hangers in line 6 6, Fig. 3. Fig. 7 is a horizontal section, partly in plan, in line 7 7, Fig. 2, of the pivotal bearings for the auxiliary levers. Fig. 8 is an enlarged sectional elevation in line 8 8, Fig. 1, of the pin-and-slot connection between the key-levers and auxiliary levers. Fig. 9 is a sectional elevation of a type-bar action of modified construction. Fig. 10 is a fragmentary elevation of the type-bar and hanger shown in Fig. 9.

Figs. 11 and 12 are elevations of two detached auxiliary levers of different lengths.

Like letters of reference refer to like parts in the several figures.

A represents a main frame, which may be of any suitable construction. The full-line circle B indicates the platen when in its normal position, and the broken-line circle indicates the position of the platen when shifted for printing upper-case characters. The type-bars, of which only one is shown at C, are arranged below and in front of the platen and are pivotally mounted, as hereinafter described, on a curved stationary support or segment D, Figs. 1 and 2, to swing upwardly and rearwardly to the printing-point. The key-levers E, one of which is shown in Fig. 1, are of the kind which are arranged longitudinally of the machine side by side, are pivoted at their rear ends in any suitable manner to the frame, and have upturned front ends bearing finger-keys *e*. (Indicated by full and broken lines in Fig. 1.)

The key-levers are alike except for the difference in the length and the shape of their front ends, necessary to locate the finger-keys in the different banks. (Indicated in Fig. 1.) Each key-lever E has a sliding or slot-and-pin connection with an upright auxiliary lever F, which is pivoted at its lower end on the frame in some suitable manner and is operatively connected at its upper end, preferably by a link *f*, with one of the type-bars, the arrangement being such that when the key-lever is depressed it oscillates the auxiliary lever, which through its connection with the type-bar swings the latter toward the platen to make the impression.

The type-bars C are preferably mounted on the segment or support D by separately-secured hangers. In the construction shown in Figs. 1 to 6 the type-bar is made of sheet metal of uniform thickness throughout, has an offset segmental circular bearing end, and the usual type-head *c*. The hanger has a body G, made of sheet metal of uniform thickness throughout, which is connected to the type-bar by two sheet-metal side plates *g*, riveted to opposite sides of the body of the hanger and pivoted to the offset end of the type-bar, which extends in between the side plates. The type-bar is stamped from stock slightly lighter than that employed for the body of the hanger, and the side plates are preferably stamped from stock considerably

lighter than that of the type-bars. After the several parts of the hanger and bar are stamped and provided with the holes for the rivets h and pivot h' , Figs. 3, 5, and 6, by which they are connected, they are pressed to flatten them approximately, and then the side plates and type-bar are hardened, after which all of the parts are ground to gage. The outer faces of the side plates g do not have to be ground; but the grinding of their inner faces and the opposite faces of the bar and body of the hanger affords smooth bearing-surfaces for the bar and insure that exact thickness of the bar and body of the hanger which will permit the bar to vibrate freely without side motion. Sheet metal cannot always be had of the exact gage desired, and as there is more or less distortion of the metal in hardening the grinding is almost imperative if the best results are to be secured. The pivot h' , on which the type-bar vibrates, has reduced ends and an enlarged central portion of a length equal to the thickness of the body of the hanger or slightly longer than the thickness of the type-bar. The shoulders thus formed prevent the side plates from being closed in and pinching the type-bar in riveting the ends of the pivot. In assembling the parts the pivot is first placed in the hole in the type-bar and then with the bar placed between the side plates g . The side plates are then applied to the hanger and secured by the two rivets h , the ends of the pivot being also headed to permanently connect the type-bar and hanger and prevent the pivot from turning in the hanger.

The inner end of the body of the hanger preferably extends forwardly at i between the side plates, so as to overhang and form a cover for the pivoted end of the type-bar. This extension not only forms a very complete guard to exclude dust and foreign matter from the pivot-joint, but also prevents the side plates from being sprung in against the type-bar when they are riveted to the body of the hanger. The advantages in this construction are that there are no adjustable parts to work loose, and owing to the exactness with which the parts can be made and to the hardening no adjustment is required. The complete hanger can be made of a thickness no greater than the type-head, thus enabling a close build. The hanger has an important advantage over a folded or bent hanger in that the sides can be ground true and smooth after hardening, and a shouldered pivot can be employed, which is not the case with a folded hanger. The construction described produces an extremely perfect and serviceable bearing that occupies the minimum space, and it can be made at less expense than others of comparative merit.

The outer ends of the hangers are preferably seated in radial slots in ribs k on the rear side of the segment and are secured there-

in by a thin flexible segmental plate k' , bearing against the back edges of the hangers, and two rows of screws k^2 , passing through holes in the securing-plate and between the hangers into threaded holes in the segment. When the screws are tightened up, the hangers are clamped firmly between the segment and the securing-plate. By loosening the screws at opposite sides of a hanger it can be withdrawn from its seat or adjusted lengthwise therein without detaching the securing-plate or other hangers.

Figs. 9 and 10 show a reversal of the type-bar and hanger construction just described, in which the side plates g' are riveted to the type-bar and the pivot oscillates in the hanger. The type-bar has a tail or extension i' , forming a cover over the pivot-bearing. This construction is desirable; but the type-bar is slightly heavier than in the construction first described.

The surface contact between the type-bar and hanger can be reduced, if desired, by forming a shallow circular groove l , Figs. 1 and 5, concentric with the pivot in the opposite sides of the type-bar, or, as shown in Fig. 9, by forming circular grooves l' in the opposite faces of the hanger. The grooves can be produced by the dies that are used to flatten the type-bar and hanger before the parts are hardened or in any other suitable way.

The auxiliary levers F are preferably located in the same plane in substantially upright position and cross the key-levers at about right angles. The portions of all of the auxiliary levers below the key-levers are of equal length, while the portions thereof above the key-levers are of the graduated lengths required to locate their upper ends at the same distance from their type-bars on the curved segment and are deflected toward the center of the segment (see Fig. 2) to intersect the radial planes in which the type-bars swing. The upper ends f^2 of the levers are bent so as to stand in such radial planes so that the links f can extend in straight lines between the auxiliary levers and the type-bars and be connected to the same by parallel pivots. Connections other than the links shown can be employed between the auxiliary levers and the type-bars.

The lower ends of the auxiliary levers are preferably seated in slots in a bar m , by which they are held laterally in place and are pivoted on a rod or wire m' , seated in the slotted bar. The levers have open-ended narrow slots m^2 , and the pivot-wire m' has flattened sides; thus enabling the detachment of the levers from the wire when turned to a position in which the sides of the slots m^2 and flat sides of the pivot-wire are parallel. When the parts are in the position shown in the drawings, the auxiliary levers can swing on the pivot-wire to operate the type-bars, but cannot be detached therefrom.

The sliding connections between the key-levers and auxiliary levers are preferably formed by pins n , secured to one set of levers and working in inclined slots n' in the other set. As shown, each key-lever is provided with a rigid horizontal pin n , having a small end riveted to the key-lever, a central enlarged portion, which enters the slot n' , and a head, which prevents the accidental disengagement of the pin from the slot. One end of the latter is, however, enlarged to allow the passage of the pin-head, so that the auxiliary lever F can be detached from its pivot-wire and key-lever, thus permitting each type-bar and its hanger, auxiliary lever, and link f , which are permanently connected, to be removed from the machine without disturbing the key-levers. As the auxiliary levers are of graduated lengths and the key-levers of different lengths, the slots n' in the auxiliary levers differ slightly in length and form to insure an equal dip of the keys and the same movement of the type-bars. The slot n' , which must incline relative to the path of movement of the pin n , may be straight or curved, as desired; but as a straight slot produces a nearly uniform motion of the auxiliary lever and type-bar, while an accelerating motion of the type-bar is most desirable, the slot is preferably curved, as shown, thereby causing a slow starting and gradually-increasing movement of the auxiliary lever and type-bar. The slot is of irregular curvature, its upper portion being curved on a smaller radius than its lower portion. The slots for the shorter levers are curved on a larger radius and are of greater length than those for the longer levers. Another and important advantage of the curved slot is that its upper part rests against the pin n at a suitable incline to ordinarily prevent the rebounding of the type-bar and yet avoids the lost motion which would result if the slot were arranged at such inclination as to make a positive lock for the type-bar when in its normal position. By slightly varying the form of the slots n' different desired motions of the type-bars can be produced—such, for instance, as a uniform motion from start to finish, different accelerated motions, or an accelerating motion from the start nearly to the printing-point and then a retarding motion. By proper formation of the slot it is possible to release the type-bar before it reaches the printing-point, so that it can make the impression from its momentum alone and also to permit the key-levers to start before exerting any pull on the type.

The auxiliary lever is preferably made substantially straight, with the slot intersecting a straight line connecting the supporting-pivot for the lever and the pivot at its upper end for the link f , and when so arranged the levers vibrate directly over their supporting-

pivots, causing a nearly horizontal movement of the links f and preventing side stress on the levers. The slots n' could all be made alike and the uniform dip of the key-levers and movement of the type-bars secured by making the auxiliary levers of the required lengths; but such construction is not so desirable on account of the more complicated pivotal arrangement for the levers which would be required.

Figs. 9 and 10 also illustrate a modified arrangement of the parts of the type-bar action in which the hangers G' are secured to the front side of the segment D' , and the links f' , connecting the upper ends of the auxiliary levers F' and type-bars C' , extend forwardly from the levers and are attached to the upper edges of the type-bars and move the type-bars by the rearward movement of the auxiliary levers. This arrangement is more desirable for machines in which the segment is shifted instead of the platen to print the different-case characters. The key-levers E' in this arrangement are pivoted to the frame in the same horizontal plane as the pins connecting them to the auxiliary levers, and when so located the type-bars are locked in their normal position. The construction shown in Fig. 1, in which the key-levers are pivoted below the plane of their connections with the auxiliary levers, is deemed preferable, as the type-bars will not be positively locked in their normal position, and the pivots for the auxiliary levers can be located directly below the pins connecting them with the key-levers, which allow the upper ends of the auxiliary levers and links f to swing more nearly in horizontal lines.

It will be observed that both the key-levers and auxiliary levers are substantially straight—that is, they are not angular or bell-crank levers, but are simple levers, one of the second class and the other of the third class. The sliding connection between the levers transmits the motion of the key-lever by an inclined plane and is very different from the crank action of a pin-and-slot connection between pivoted levers in which the slot is only provided to allow of the movement of the pin, which is necessitated by the fixed pivots of the levers.

We claim as our invention—

1. The combination in a type-writing machine, of a pivoted type-bar, a key-lever pivoted at one end, an auxiliary lever pivoted at one end and operatively connected at the opposite end to said type-bar, said levers crossing each other, a projection on one of said levers, and a surface on the other lever which is slidably engaged by said projection and is curved in such relation to the path of movement of said projection as to cause an accelerated movement of the type-bar, substantially as set forth.

2. The combination in a type-writing ma-

chine, of a type-bar pivoted to swing upwardly and rearwardly, a substantially horizontal key-lever pivoted at one end, an upright auxiliary lever pivoted at its lower end and operatively connected at its upper end to said type-bar, said levers crossing each other between their ends, a pin on one of said levers, and said other lever having a slot of irregular curvature in which said pin slides, substantially as set forth.

3. The combination in a type-writing machine, of a frame, a series of type-bars, a series of key-levers extending under the type-bars and pivoted at their rear ends, a series of upright auxiliary levers operatively connected at their upper ends to the type-bars and to the frame at their lower ends, said levers crossing between their ends, and pin-and-slot connections between the two series of levers, the slots being curved, and the curvature being on a smaller radius at the upper ends of the slots, substantially as set forth.

4. The combination in a type-writing machine, of a frame, a series of pivoted type-bars, a series of key-levers pivoted at one end, a series of auxiliary levers of graduated lengths crossing said key-levers between their ends and operatively connected at one end to the type-bars and pivoted at their other ends to the frame, and pin-and-slot connections between the two series of levers, the slots being of different form to compensate for the different lengths of the levers, substantially as set forth.

5. In a type-writing machine, the combination of a series of pivoted type-bars arranged to swing upwardly and rearwardly, a series of key-levers extending rearwardly under the type-bar pivots, a series of upright auxiliary levers of the third class fulcrumed at their lower ends below the key-levers on horizontal pivots and extending vertically to points above the key-levers, sliding connections between the key-levers and auxiliary levers consisting of horizontal pins on one series of levers engaging curved inclined faces on the other series of levers, and connections between the upper portions of the auxiliary levers and the type-bars, substantially as set forth.

6. In a type-writing machine, the combination of a series of type-bars pivoted in a vertical arc to swing upwardly and rearwardly, a series of key-levers of different lengths extending beneath the type-bars and pivoted at their rear ends, a series of upright auxiliary levers of graduated lengths fulcrumed below the key-levers on the same horizontal axial line and extending above the key-levers and connected at their upper ends to the type-bars, pins secured to said key-levers in substantially the same horizontal line and engaging in slots in said auxiliary levers, said slots being of different shapes where- by equal movements of the key-levers will

produce equal and accelerating movements of the upper ends of said auxiliary levers and type-bars, substantially as set forth.

7. The combination in a type-writing machine, of a series of type-bars pivoted in a vertical segment to swing upwardly and rearwardly, a series of key-levers extending rearwardly under the type-bars, a series of upright auxiliary levers supported by horizontal pivots at their lower ends below the key-levers and extending vertically to points above the key-levers, then on converging lines to the intersection of the radial planes in which the type-bars swing, and having their upper ends arranged to stand in such radial planes and operatively connected to the type-bars, and slot-and-pin connections between the two series of levers, substantially as set forth.

8. The combination in a type-writing machine, of a frame, a series of type-bars radially pivoted in a vertical segment to swing upwardly and rearwardly, a series of key-levers extending rearwardly under the type-bars and pivoted at their rear ends, a series of upright auxiliary levers of graduated lengths having their upper ends operatively connected to the type-bars by links and pivots arranged at right angles to the type-bars, their lower ends connected to the frame by horizontal pivots below the key-levers, their central parts connected to the key-levers by slots and horizontal pins, and their upper portions between the type-bar connections and horizontal pins arranged on inclined lines, substantially as set forth.

9. The combination in a type-writing machine, of a frame, a series of radial type-bars arranged to swing upwardly and rearwardly, a series of key-levers of the second class extending rearwardly under the type-bars on substantially horizontal parallel lines, a series of upright auxiliary levers of graduated lengths operatively connected at their upper ends to the type-bars and having slot and horizontal pin connections with the key-levers between their ends, and horizontal pivotal connections between said auxiliary levers and the frame directly under the pin-and-slot connections with the key-levers, substantially as set forth.

10. The combination in a type-writing machine, of a type-bar body and hanger-body of slightly-different thicknesses, but each of uniform thickness throughout, and separate connecting-plates arranged on opposite sides of said type-bar and hanger bodies, said connecting-plates being rigidly secured to the thicker body and pivotally connected to the thinner body, substantially as set forth.

11. The combination in a type-writing machine, of a type-bar body and hanger-body of slightly-different thickness, and separate connecting-plates arranged on opposite sides of said type-bar and hanger bodies, said con-

necting-plates being rigidly secured to the thicker body, and a pivot for the thinner body consisting of a rivet joining said plates and having shoulders to hold said plates spaced apart a distance equal to the thickness of the thicker body, substantially as set forth.

12. The combination in a type-writing machine, of a type-bar and hanger consisting of a pair of independent opposable side plates, a type-bar body, and a hanger-body between the side plates, one of said bodies being shaped to overhang the other body to exclude dust, substantially as set forth.

13. The combination in a type-writing machine, of a type-bar and hanger consisting of a pair of independent opposable side plates, a type-bar body, and a hanger-body between the side plates, one of said bodies having a segmental circular part oscillating between

the side plates and the other body forming a bridge over said oscillating part between the side plates, substantially as set forth.

14. The combination in a type-writing machine, of a type-bar and hanger consisting of a pair of independent opposable side plates, a type-bar body, and a hanger-body between the side plates, one of said bodies being formed to overhang the other part between the side plates, and the side plates being shaped to conform to said overhanging part, substantially as set forth.

Witness our hands this 22d day of April, 1905.

HARVEY A. MOYER.
EMMIT G. LATTA.

Witnesses:

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FRANK E. REID.