

(No Model.)

3 Sheets—Sheet 1.

K. KIEFER.
TYPE WRITING MACHINE.

No. 468,663.

Patented Feb. 9, 1892.

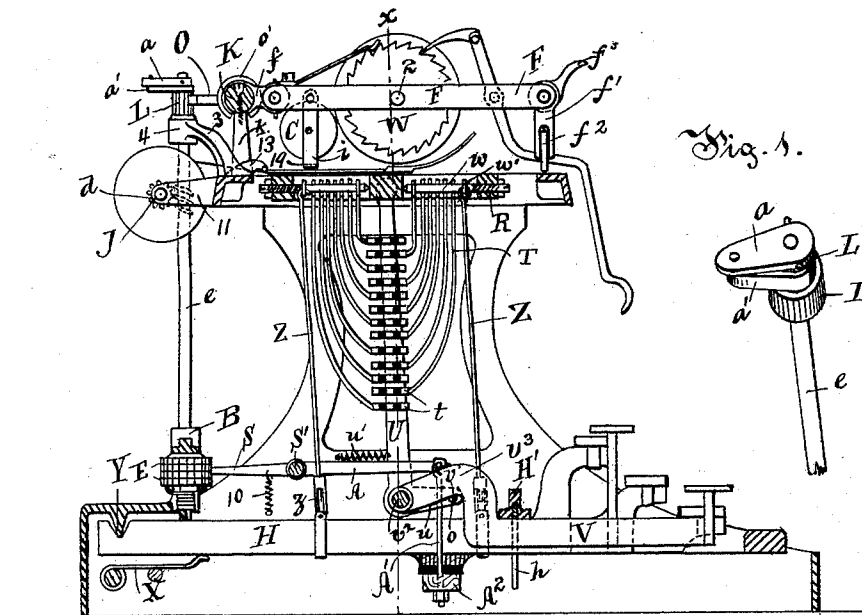


Fig. 1.

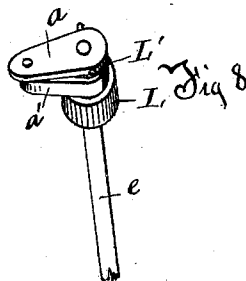


Fig. 8.

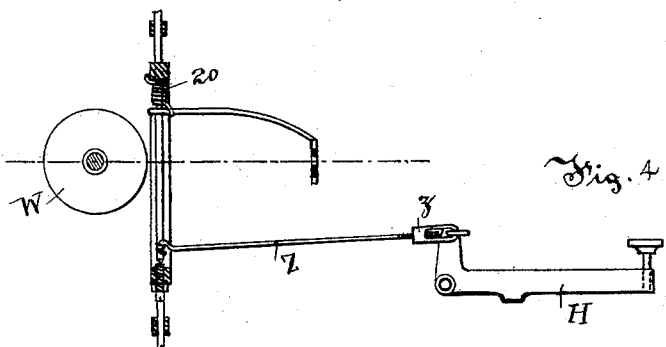


Fig. 4.

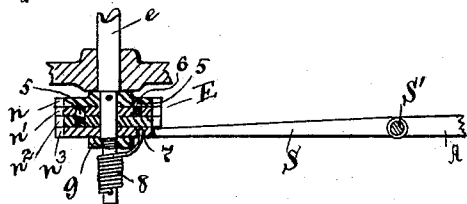


Fig. 5.

Witnesses:
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E. H. Ayres

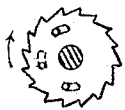


Fig. 6.

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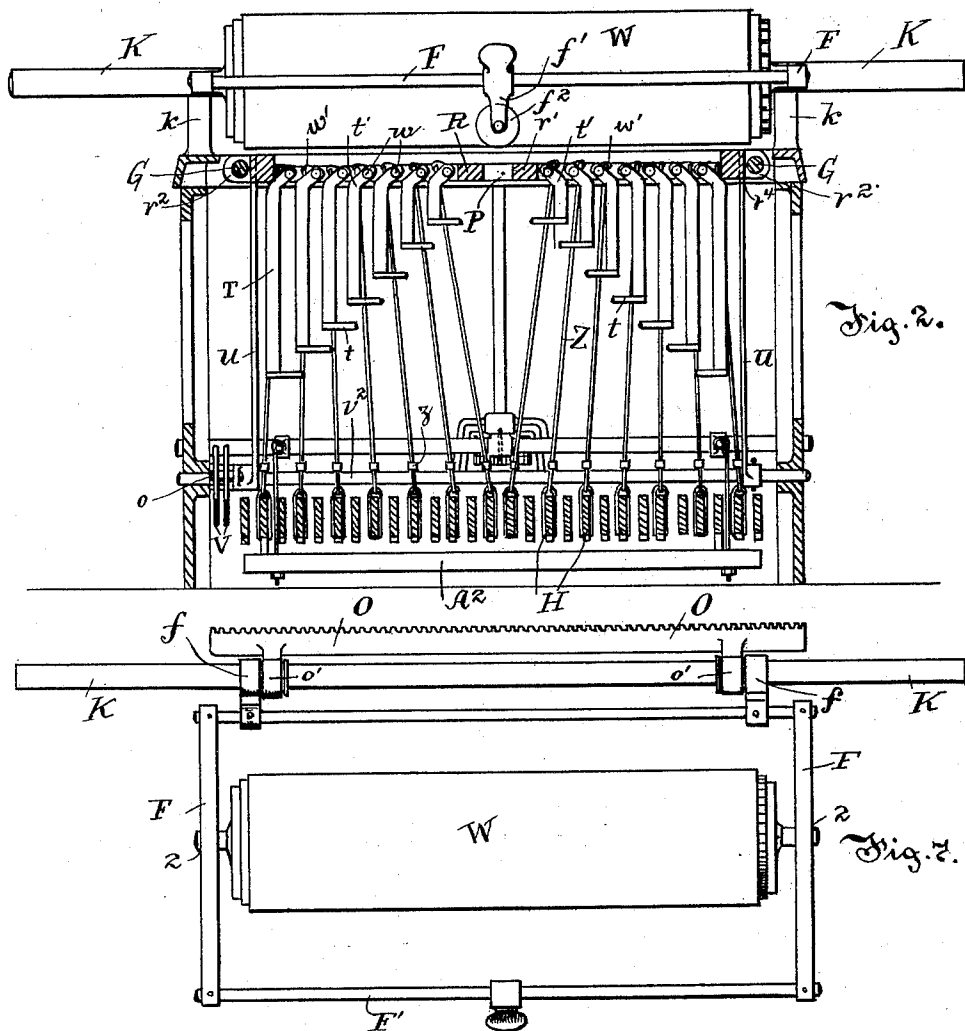
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3 Sheets—Sheet 2.

K. KIEFER.
TYPE WRITING MACHINE.

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3 Sheets—Sheet 3.

K. KIEFER.
TYPE WRITING MACHINE.

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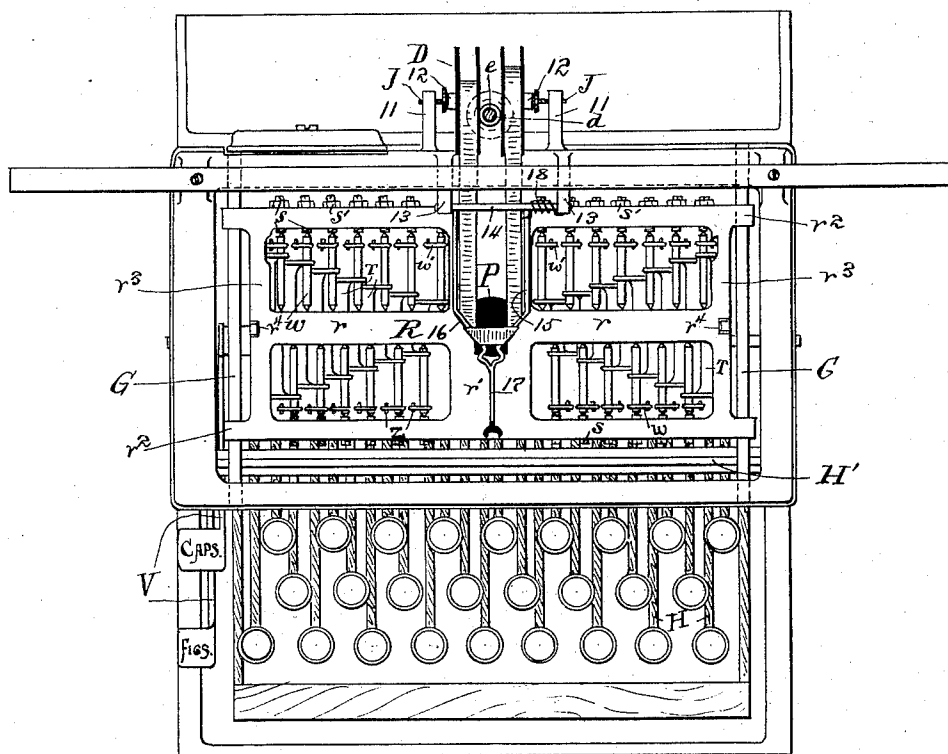


Fig. 3.

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UNITED STATES PATENT OFFICE.

KARL KIEFER, OF WORMS, GERMANY.

TYPE-WRITING MACHINE.

SPECIFICATION forming part of Letters Patent No. 468,663, dated February 9, 1892.

Application filed July 19, 1890. Serial No. 359,285. (No model.) Patented in Germany April 12, 1889, No. 51,033.

To all whom it may concern:

Be it known that I, KARL KIEFER, of the city of Worms, in the Empire of Germany, have invented certain new and useful Improvements in Type-Writing Machines, (for which I have received German Patent No. 51,033, dated April 12, 1889,) of which the following is a specification.

My invention is hereinafter fully described, illustrated in the accompanying drawings, and specifically pointed out in the claims.

Referring to the accompanying drawings, wherein like letters and numerals of reference point out similar parts on each figure, Figure 1 is a transverse median sectional view of a type-writing machine constructed according to my invention. Fig. 2 is a vertical longitudinal section on the line xx of Fig. 1, parts being shown in full. Fig. 3 is a top plan view of the machine with the carriage removed. Fig. 4 is a detail view of one of the type-bars arranged to operate in a horizontal plane. Fig. 5 is a detail view of the spacing mechanism. Fig. 6 is a face view of one of the spacing-disks shown in section in Fig. 5. Fig. 7 is a top plan view of the carriage detached from the machine. Fig. 8 is a detail view of the upper portion of the spacing-rod, showing its clutch-head.

The leading features of my invention consist in the peculiar arrangement of the type-levers, in means for regulating the ribbon movement and its attached indicator, in means for interchanging the character and style of type to be imprinted, in the arrangement upon single type-bodies of a multiplicity of characters, either of which can be separately brought into operation by movement of a portion of the cap-frame of the machine, and in means for regulating spacing movements of the carriage.

Among the advantages secured by my improved machine is the reduced number of keys and its adaptability for rapid interchange of indicating characters, its light weight, its simplicity, and cheapness.

The type bars or levers T are of unequal length, their upper ends being aligned on a horizontal plane at fixed distances apart, all of which when operated strike terminally at one and the same spot. The end of each bar, carrying upon a body t its respective char-

acter, moves freely and independently of each other one. As will be seen from the drawings, said bars in their normal position present at their ends a series of horizontal steps, while the type-bodies they carry present a series of vertical steps. The opposite ends of the bars are each curved outwardly, as seen at t' , and are each adjustably pivoted at w in the movable frame R .

On the outside of the frame R are a series of set-screws s , corresponding in number to the number of pivots w , the indented end of each screw forming a bearing for the outer pointed end of one pivot. By turning said screws the pivot is tightened or loosened, and thereby said bars are adapted to move with the desired freedom. By means of said screw adjustment it is manifest that each lever can be independently removed for cleansing, repairing, or any other purpose. Each screw s is provided with a locking-nut s' , whereby when said screws are once adjusted they are maintained in proper position. The inner end of each pivot rests against a bar r , extending longitudinally across the frame R , dividing it into two equal parts. The bars or levers T are flat steel arms, which, by means of their pivoted connection, as described, are arranged to swing independently past each other without interruption or coming within or across their respective paths. Each arm, in progressive order, extends in length beyond the next preceding one, whereby it will be manifest that neither of the type-bodies carried on said bars can come into collision when the device is operated.

Fig. 3 shows the complete distribution of all the levers, preferably twenty-six, although said number may be increased or diminished, as desired, and be within the scope of my invention.

The frame R is subdivided into four quarter-spaces by cross-bar r and transverse bridge r' , extending at right angles to said cross-bar. Extending outwardly from the ends at the corners of the frame R are lugs r^2 , which are apertured for the passage therethrough of the traveler-rods G and upon which the frame R is reciprocatingly moved. The bearings of the pivots w are all arranged within the outer beams r^3 of the frame R , and the bars T depend therefrom in groups within the four

spaces, as plainly shown in Fig. 3. At the intersection of the cross-bar r and the bridge-bar r' of the frame R is a rectangular aperture P, through which all the type-bodies are adapted to be projected upwardly against the platen. (See Figs. 2 and 3.)

In the drawings, there are shown in each rear quarter-space seven pivoted levers, and in each forward quarter-space six pivoted levers, the opposite spaces carrying levers in alternation, so that when moved they will travel intermediately along and across independent pathways.

The pivots w have small lever-arms w' extending at approximately right angles to the levers T. Said lever-arms w' are each connected to the upper end of a link Z. The opposite end of each of said links is joined to a key-lever H. Each type-body t carries on its face three letters or characters, preferably a capital letter, a small letter, a numeral, or symbol.

In ordinary type writing machines when it is desired to change the character of the type it is required that the platen-cylinder W, which carries the paper, shall be moved forward and backward, so as to receive one or the other imprints from the face of the same type-body; but by my improvement I accomplish this result by moving the frame R, adjusted to reciprocate by means of the connection, to the traveler G, loosely passing through the apertured lugs r^2 , as previously described. The movement of the frame R upon the travelers G is accomplished by operation of compound levers, their progress being regulated by limiting-stops. (Not shown in the drawings.) Said levers consist of two parallel horizontal key-bars V, pivoted at v' at one end of a horizontal rod v^2 , which extends across the frame. The key-bars V are at their rear ends invertedly bent to compose a U-shaped member v^3 . (See Fig. 1.)

Rigidly attached at opposite ends of the rod v^2 are bell-crank levers U, the longer arms of which extend vertically up to the frame R and engage recesses r^4 in the frame, whereby said frame is reciprocated horizontally on the traveler-rods G. Attached to the longer arms of the levers U are small spiral springs u' , extending rearwardly and fastened to the frame. Said springs serve to maintain a constant rearward tension on the levers and the frame R. At one side of the machine the levers U are provided with a short arm u , from which extends a pin o , passing under the bend v^3 of lever V and adapted to be depressed by either of said levers at will to prearranged limits. The levers U on both sides of the rod v^2 are simultaneously moved vertically, whereby the frame R is reciprocated with regularity.

It will be readily understood that by depression of the levers V to a predetermined degree respective rows of type are brought into striking position. For instance, when the machine is in normal condition one set of characters will be in position for operation.

By striking one lever V the frame R will be moved a given distance and another group of type be brought ready for action. By depressing the other lever the third group will be presented for imprinting, and so on interchangeably can either style of type or character be brought into action.

The wooden key-levers H are rearwardly fulcrumed on metal pivot-rib Y integral with the base-frame of the machine, said levers and their connections being normally pressed upwardly by spring X and their front upper edges being kept normally pressed against a longitudinal bar H', which preserves their alignment when at rest. Projecting downwardly from the bar H' are a series of guide-pins h , one of which lies intermediately of the several key-levers. The length of the links Z can be regulated by screw-coupling z . The stroke operation is therefore very simple. Pressing upon the key-levers H causes each link Z to depress the short levers w' , attached to pivots w , and the type-lever T, rigidly connected thereto, traverses its path and carries the face of the type-body to and against the paper on W. As soon as the touch is relinquished the type-lever drops by gravity to a position of rest and the key-lever H is pressed upwardly by spring X against cross-bar H'. Said cross-bar is maintained firmly in position on the frame of the machine by bolts screw-threaded at one end, whereby said bar can be tightened as occasion may require. The paper is conducted between two cylinders, one of which W is coated with rubber in order to modify the impact of the blow of the type. These cylinders are mounted in bearings of the carriage, as shown in Fig. 1. This carriage is adapted to move laterally, as common in such machines. On either side it is provided with end bars F, supplied with hangers i , each having an orifice to form bearings for the trunnion of a revoluble friction-cylinder C. The platen-cylinder W is mounted in bearings 2 of the end bars F. Said bars at their rear ends each carry a saddle f , which embraces the rail K and is adapted to slide over it laterally. Uprising rearwardly upon the cap-frame are opposite fixed posts k , to the heads of which is screwed the rail K. The saddles f , as will be seen from the drawings, do not entirely encircle the rail K, but have a lower opening, whereby they can readily pass over the supporting-posts k . At the forward end of the bars F is a rod F', provided centrally with a bifurcated hanger f' , into which is journaled a traveling wheel f^2 , which rolls along a track on the edge of the cap-frame. The hanger f' has an outwardly-curved thumb-piece f^3 , through which the carriage is lifted. For moving the carriage laterally step by step there is attached rearwardly of the bars F a horizontal ratchet-bar O, which is forwardly supplied at each end with a curved open sleeve o' , which as said bar is reciprocated will freely pass over the saddles f , and under which said saddles are free to turn.

The toothed edge of the bar O meshes with a small horizontal pinion L at the upper end of a vertical rod *e*, which rod passes through the apertured head of the bridge B of a foot-piece attached to the base of the frame and is free to revolve within said aperture. Said rod at its lower end carries a series of disks E, constituting a system for a purpose presently set forth. The upper portion of the rod *e* passes through a guide-ring 4 at the extremity of a curved arm 3, projecting rearwardly from the middle of the cap-frame, to which it is firmly connected. The rod *e* has at its upper end a plate *a* eccentrically connected thereto by rivet *a*^x. Pivoted to the under portion of said plate is a curved pawl *a*^y, interiorly serrated. (See detail, Fig. 8.) Under the plate *a* is an integral compound cog-wheel consisting of two members L L', the upper being preferably of smaller diameter than the lower one. The lower one L meshes with the ratchet-bar O and is turned as said ratchet-bar and the carriage with which it is connected are moved from side to side. The pawl *a*^y normally rests against the wheel L', and its serrations loosely intermesh the ratcheted periphery of said member. Upon starting the machine the pawl *a*^y engages the upper wheel L', locking both members L L' to the vertical rod *e*, while when action is suspended and the carriage is returned by hand said united wheels turn loosely upon the rod. The lower end of the vertical rod *e* is provided with spacing mechanism consisting of a series of disks having peripheral teeth, four being shown in the drawings, independently mounted on said rod. The upper disk *n* is firmly united thereto. The next underlying one *n*¹ has an upwardly-projecting pintle 5, which takes into a curved slot 6 in the disk *n*. The length of said slot is such as to permit the pintle 5 to traverse an angular distance equivalent to the space of one of the peripheral teeth. The third disk *n*² is provided with a like pintle 5, taking into a like slot 6 in the disk *n*¹, and so on in each successive disk is a pintle engaging a slot of the next overlying one. The lower disk *n*³ is provided with a small orifice 7 to receive the end of the upward arm of a spring 8, surrounding and secured to the foot of the rod *e*. The disks are kept in upward position by a nut 9.

S is a rocking bar rigidly attached to the middle of shaft S', extending across the frame of the machine, its opposite ends being journaled therein, through which said rocking bar is elevated or depressed. Extending forwardly at each end of said shaft is an arm A, its extremity locking with a hook at the upper end of a wire hanger A'. Each of said hangers extend downwardly and carries one end of a horizontal wooden bar A², which extends the length of the machine under the key-levers, which bar is depressed when any key is struck. In order to control the degree of depression of said bar, the lower edge of each key-lever is provided with a small pro-

jection proportionate in size to the width of the letter or character carried on each type-bar and does not lie in one uniform horizontal plane, as is usual in such parts of analogous machines. The finger of the rocking bar S (see Figs. 1 and 5) engages the peripheral teeth of the disks of the system E.

It is to be understood that the carriage always has a tendency to be moved to the left by the action of an incased spring, as commonly known.

The actuation of the spacing devices and results thereof may be thus set forth: The carriage, as will be seen, is allowed to move normally a distance technically known in the typographic art as an "em;" but by my improved regulating-gear this moving distance is controlled so as to thereby secure less than an em when the nature of the imprint, character, or letters so requires. The ratchet-bar O, the small cog-wheel L, the rod *e*, and the disks of the system E, in connection with rocking bar S, constitute what I denominate an "escapement." The ratchet-bar O has sleeves *o*^y overlying and concentric with saddles *f* of the carriage, allowing said carriage to be lifted without disturbing the horizontal position of the ratchet-bar. The tendency would then be for the ratchet-bar, through actuation of the incased carriage-spring and by aid of the cog-wheel L, to turn the rod *e* in direction of the arrow, Fig. 6, were not this movement checked by the ratchet-stop of the rocking bar S, meshing with the lower one of the series of disks in the system E. (See Fig. 5.) The system shown in said figure consists, as before set forth, of four small toothed disks *n n' n'' n'''*, equal in diameter and overlying each other, the upper one being firmly united to the rod *e*. The other disks are loosely mounted on said rod and are revoluble thereon within certain limits intermediate of the disk *n* and nut 9. The relative movement of said disks is controlled by the respective pins 5 and slots 6, so that each disk will only turn in relation to the other to the extent of one peripheral tooth. The combined progressive movement beginning with *n'''* consecutively to *n'* is therefore the width of three teeth. Now let a key be depressed. It will have the effect of lowering the bar A² and the arms A to a distance limited by the size of the projection on the edge of that particular key-lever. The rocking bar S is raised as the arm A is lowered, and its finger will pass up to the distance of one of the disks of the system E. As said finger rises and engages the next overlying disk *n''*, it still keeps the system of disks and connection with the carriage stationary; but the lower disk *n'''*, being released and actuated by the spring 8, moves around in direction of the arrow to its limit—i. e., one tooth-face—being stopped by the pin falling within the slot of the overlying disk. Now the character having been imprinted, the key is permitted to rise to its normal position. A spiral spring 10 causes the rocking bar S to

resume engagement with the lower disk n''' . There being a difference of one tooth-space between the present and normal position of the upper three disks with relation to the lower one of the system, and they being free to move to that extent, said three disks and rod e , with its upper connections, will be turned by pressure of the carriage-spring and the carriage will move only the space required by the respective (narrowest) character imprinted—for instance, the letters "i," "l," "f," "t," &c. Now if another key be depressed which operates a type-character of wider dimension, the projection under the key-lever being proportionately greater, it will obviously depress the bar A^2 to a lower plane, thus raising the rocking bar S , say, past two disks instead of one, as in the former instance. Two disks being now free to turn each a distance equivalent to one tooth, the recoil will serve to move the carriage and connections a distance equal to the width of two teeth—to wit, twice the distance of the movement next previously set forth—and the type character will occupy double the space, this movement being adapted, say, for letters "v," "r," "a," &c. A still greater projection is found below key-levers actuating larger characters of the standard em sizes. In this case the rocking bar S is lifted to the upper disk n , with which it engages, and the carriage is free to move a distance equivalent to three teeth.

For the purpose of fully illustrating my invention I show but three movable disks; but the number may be increased and differently and diversely graded and the disks may be toothed and geared to secure diverse distances, if required, and be within the scope and purview of my invention.

Like all similar devices, a ribbon is used in my machine, the arrangement being shown in Figs. 1 and 3.

Two parallel posts 11, projecting rearwardly from the middle of the cap-frame, carry at their extremities bearings for ends of a shaft J . Riding loosely on the shaft are two spools D , each of which alternately receives and returns the ribbon. Outside said spools the shaft J is screw-threaded and carries two milled nuts 12, each of which is adapted to lock its corresponding spool to the shaft. Between the spools the shaft has rigidly attached to it a small worm-wheel d , which engages a worm on the vertical rod e of the spacing mechanism. Uprising from the rear of the cap-frame and approximately aligned with the posts 11 are two incurved supports 13, to which are attached the ends of a short cylindrical guide-rod 14. Hinged to this guide-rod by its own overturned ends is a bent-wire ribbon-guide 15, having shoulders 16 and its forward part 17 prolonged and upwardly curved to form a paper-guide and indicating-finger. On the guide-rod 14 is a spiral spring 18, (see Fig. 3,) which engages the wire ribbon-guide and tends to press it upwardly. The guide is, however, kept down while the ma-

chine is in operation by a friction-rail 19, extending across the ends of the hangers z . When, however, the carriage is raised for any purpose, the spring 13 will cause the wire ribbon-guide and its finger to rise also, and the relative position of the centers or hinges of both is such that when raised the finger 17 will rest against the under part of the platen and on that spot on the paper where the type will next strike. The ribbon is wound in the same circular direction on the two spools, being brought forward from thence and carried over and across the shoulders 16. The portion between said shoulders overlies the aperture P in the frame R and is that on which the type characters impinge.

The operation of the ribbon-moving mechanism is briefly as follows: Supposing the bulk of the ribbon to be wound on the right-hand spool, then the empty left-hand spool is locked to the shaft by screwing up its nut, while the full spool is allowed to ride loosely as a feeder. As the machine is operated the spacing mechanism will be set in motion, and through the worm on rod e and worm-wheel d on shaft J this motion is transmitted to the shaft J and its locked empty spool, which forthwith begins to wind the ribbon, drawing it in short lengths around the wire guide 15 and gradually unwinding it from the feeding-spool. When the feeding-spool has become empty, its nut is screwed up and the other one loosened, thus reversing the feed.

Fig. 4 shows a modification in the arrangement of parts of the machine, whereby the writing may be viewed as it progresses. In this case the carriage, with its platen, lever, ratchet-bar, and other parts, instead of being at the top of the machine, is placed at the back thereof. The relative arrangement of all the parts is unchanged, with the exception of the position of the key-levers, which must bear the relation to the other parts shown in Fig. 4, being made in a bell-crank form. The type-bars, also moving in horizontal planes, require a spiral spring 20 to force them back to their position of rest. The springs u' , which keep the sliding frame R back, may, however, be dispensed with, as said frame in its altered position must work vertically, and its own weight will keep it down.

Having now fully described my invention and the manner of its operation, what I claim, and desire to secure by Letters Patent of the United States of America, is—

1. A type-writing machine provided with a movable cap-frame divided into four sections, each section supplied with a separate group of type-levers of graduated lengths carrying type-bodies having three or more letters or characters thereon, said levers when the machine is actuated adjusted to traverse independent paths and to swing each type-face through a central opening in the cap-frame to a common point on the platen, substantially as described.

2. The type-levers T, each supplied with a multiform type-body *t*, hung within sections of the frame R by pivots *w*, adjustably held in place by set-screws *s*, substantially as described.

3. The movable frame R, divided into sections by cross-bar *r*, and bridge-bar *r'*, having extending from the ends of its outer beams *r*³ lugs *r*², apertured for passage of travelers G, in combination with said travelers and adapted to be reciprocated thereon, as and for the purpose intended, substantially as described.

4. In a type-writing machine, mechanism for moving the carriage laterally step by step, consisting of the bars F, having attached to the rear thereof a horizontal ratchet-bar O, provided with curved open sleeves *o'*, adapted as said bar is reciprocated to fall over saddles *f*, a horizontal pinion L, meshing with horizontal bar O, and a vertical rod *e*, carrying at its lower end series of disks E, substantially as described.

5. In a type-writing machine, the combination of the end bars F, hangers *z*, the horizontal friction-rail 19, the ribbon-guide 15, fingers 17, and spring 18, substantially as described.

6. In a type-writing machine, spacing mechanism consisting of a horizontal ratchet-bar intermeshing with a horizontal pinion carried at the upper end of a revoluble vertical rod, the lower end of which carries a series of overlying toothed disks engaged by the end of a rocking lever actuated through a shaft and an underlying bar by the key-levers, substantially as described.

7. A type-writing machine provided with spacing mechanism consisting of a series of overlying disks having peripheral teeth, the upper one *n* firmly adjusted to vertical rod *e*, all kept in position by nut 9, each disk underlying the upper one being supplied with a short uprising pintle 5 and curved slot 6, the

lower one having aperture 7 for reception of the upper end of spiral spring 10, in combination with rocking bar S, attached to shaft S', one end of said bar arranged to mesh with the peripheral teeth of the disks of the system, the opposite end being connected to the hooked end of wire hangers A', passing through supporting-bar A², substantially as described.

8. In a type-writing machine, the ribbon-actuating mechanism consisting of a shaft journaled in posts attached to the frame of the machine, said shaft carrying two loosely-mounted parallel spools and outside of said spools having its ends screw-threaded and provided with milled nuts, whereby said spools may be alternately locked thereto, said shaft also being provided intermediate of said spools with a rigidly-attached worm-wheel intermeshing with gear attached to the spacing mechanism, through which said shaft and its locked spool are revolved as the spacing mechanism is operated, as and for the purpose intended, substantially as described.

9. In a type-writing machine, the ribbon-guide and space-indicating mechanism consisting of a wire-ribbon guide 15, hinged to guide-rod 14 and adapted to be raised by spiral spring 18, the forward end of said ribbon-guide being extended to form an up-curved finger 17, said finger being so adjusted that when the carriage is raised it will rest on the spot on the paper where next the type will impinge, in combination with friction-rail 19, extending across the ends of hangers *z*, depending from end bars F of the carriage, said friction-rail when the machine is in operation resting upon the ribbon-guide and retaining it in a horizontal position, substantially as described.

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