

No. 644,515.

Patented Feb. 27, 1900.

H. C. HESS.  
WRITING MACHINE.

(No Model.)

(Application filed Oct. 23, 1899.)

5 Sheets—Sheet 1.

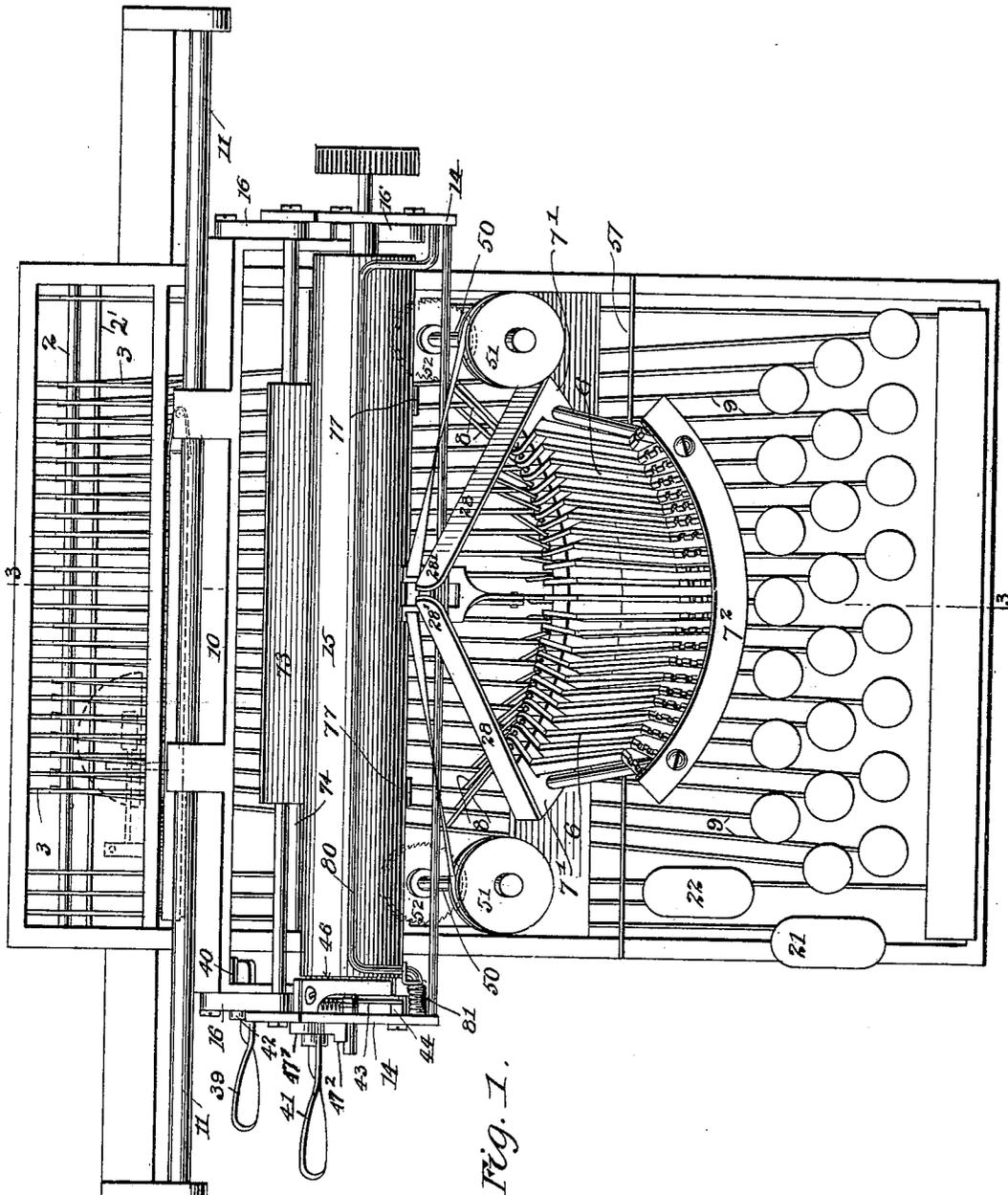


Fig. 1.

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Fig. 2.

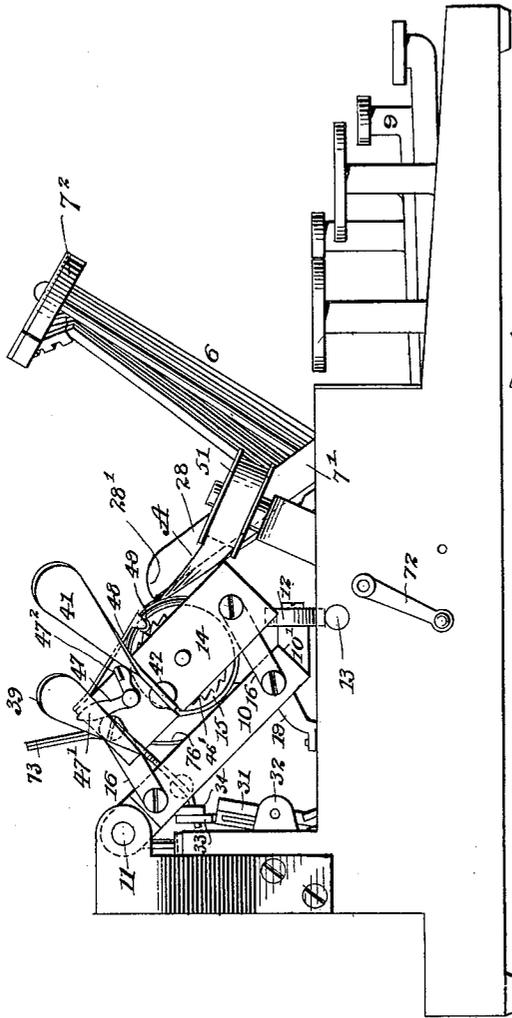


Fig. 11.

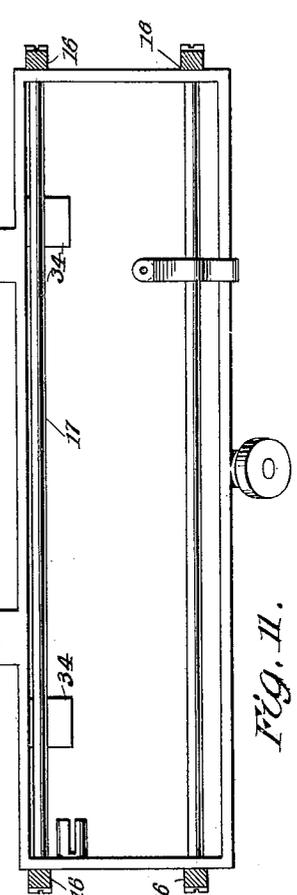
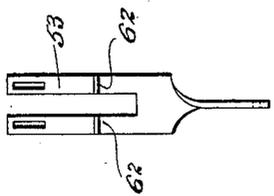


Fig. 12.



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5 Sheets—Sheet 3.

Fig. 3.

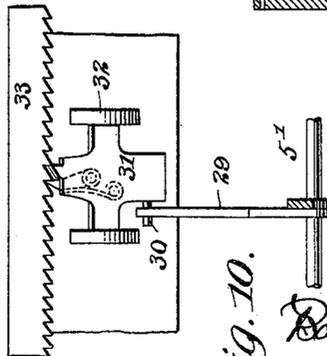
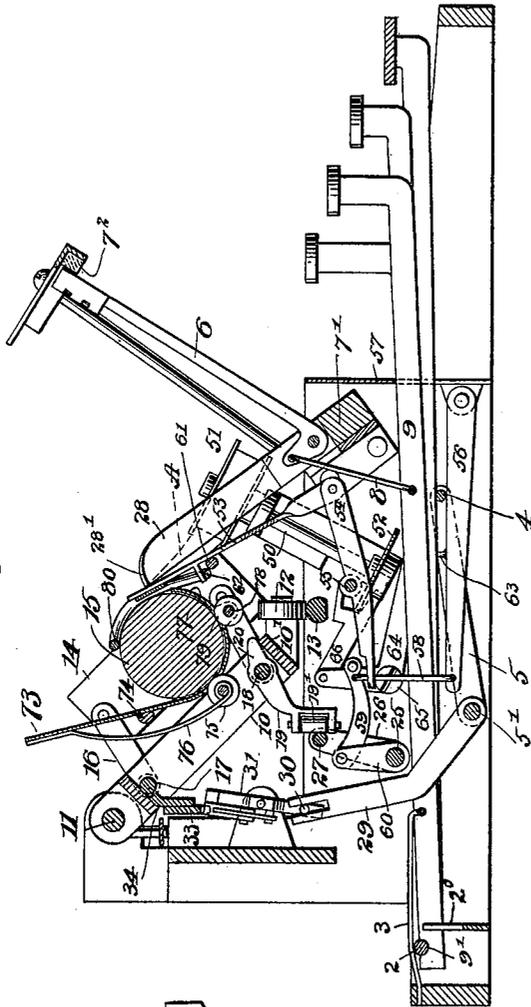


Fig. 10.

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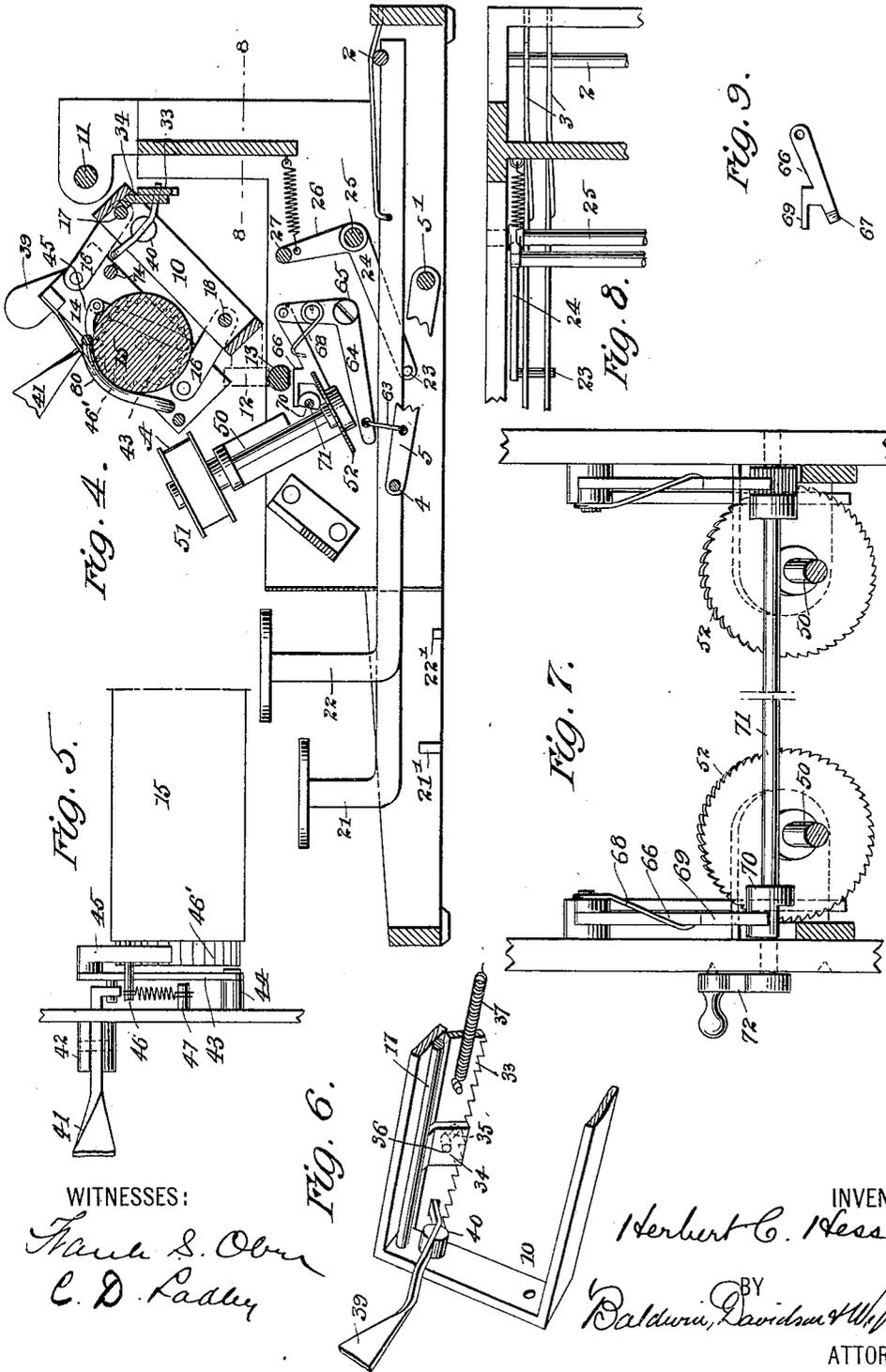
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5 Sheets—Sheet 4.



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(No Model.)

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Fig. 13.

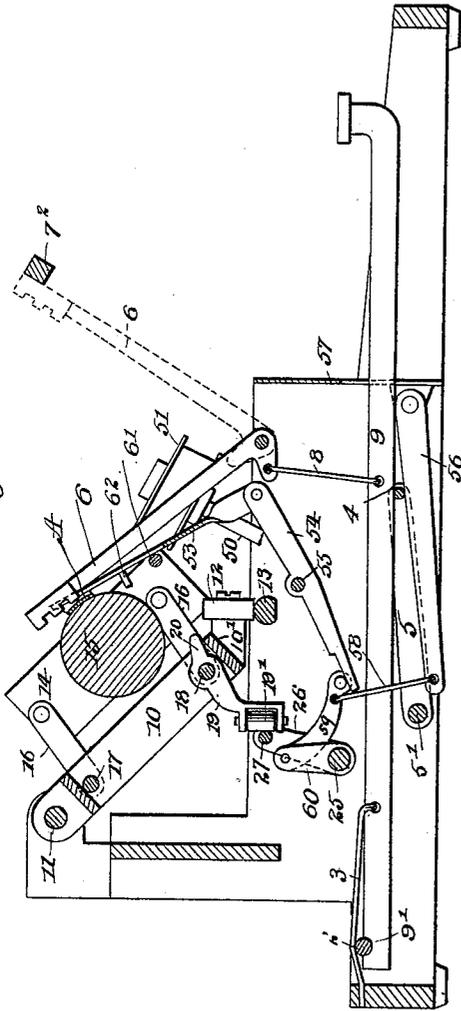
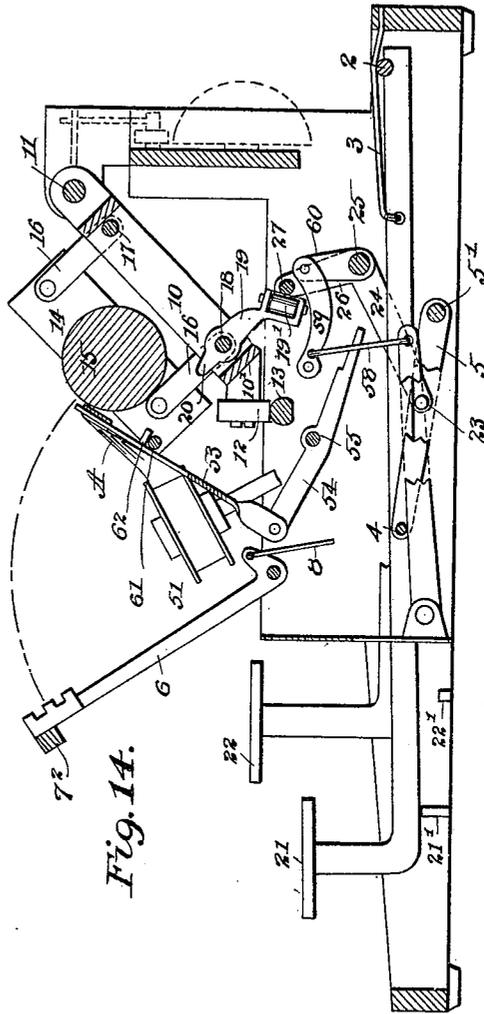


Fig. 14.



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# UNITED STATES PATENT OFFICE.

HERBERT C. HESS, OF NEW YORK, N. Y.

## WRITING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 644,515, dated February 27, 1900.

Application filed October 23, 1899. Serial No. 734,494. (No model.)

*To all whom it may concern:*

Be it known that I, HERBERT C. HESS, a citizen of the United States, residing at New York city, (Flatbush,) borough of Brooklyn, State of New York, have invented certain new and useful Improvements in Writing-Machines, of which the following is a specification.

My invention relates to that class of writing-machines in which the platen is movable at right angles to its axis at will, so that the printing-point thereon will be caused to occupy two or more positions to receive the impact of two or more characters on the type-bar.

In the machine of my invention the platen is arranged in the rear of a vertical transverse plane passing through the machine, and the type-bars, which are pivoted at or near their lower ends, in their normal position lie at rest on the opposite side of said plane. Preferably the general plane in which the type-bars lie and that in which the platen lies are respectively at an angle of forty-five degrees or thereabout to said vertical plane. The platen is made to be movable at will transverse to its axis and in the oblique plane before mentioned, in which it is located. Correspondingly the respective type-bars have multiple characters thereon arranged in line with the length of bar. In the machine which I have elected to illustrate as a practical embodiment of my invention and which shows it in the form now best known to me the type-bars have, respectively, three characters thereon, and the platen has a normal position corresponding with the character nearest the pivot of the type-bar, a second position corresponding with the adjoining type-bar character, and a third position corresponding with the character nearest the outer or upper end of the type-bar. In a machine so organized the writing will be plainly in view, as the impressions being made will be upon that part of the platen in line with the somewhat-downward gaze of the operator.

The principles of my invention are obviously applicable also to that class of machines wherein the type-bars have multiple characters and are longitudinally movable to bring different characters thereon to the printing-point—that is to say, the obliquely-movable carriage and general disposition of parts dis-

closed in the present case may be used in conjunction with the longitudinally-movable type-bars, the obvious purpose of which would be to reduce the number of operating-keys. Any suitable plan of inking may be adopted. Many are known in the art wherein ink is applied to the type to make a direct impression upon the paper. Others employ a ribbon interposed between the paper and the characters on the type-bars. I prefer to employ a ribbon-inking device. It may be one constructed according to any of the many well-known ways of progressively feeding or drawing the ribbon across the face of the platen from one bobbin onto another, and the ribbon may of course traverse in a fixed path and be of such width as to cover either of the three characters on the type-bar from which an impression is being taken. I should prefer, however, to employ a ribbon mechanism in which the ribbon is normally retracted, so as to expose the printing point or line on the platen and is advanced to cover it during the excursion of the type-bar to the printing-point in whichever position the platen may be set. Since, however, my invention is not dependent upon ribbon mechanism of this special character, I have, while illustrating in the drawings hereof a ribbon mechanism of this kind, not claimed it herein, but have made it the subject-matter of a separate application, Serial No. 734,495, filed October 23, 1899.

In the accompanying drawings, Figure 1 is a plan view; Fig. 2, a side elevation; Fig. 3, a central longitudinal section on the line 3 3 of Fig. 1; Fig. 4, a like section looking in the opposite direction; Fig. 5, a detail view of the line-spacing device; Fig. 6, a detail view showing the devices for moving the carriage-rack out of operative engagement with the feed-pawl; Fig. 7, a detail plan view illustrating the mechanism by which the ribbon is drawn from one spool to the other; Fig. 8, a detail section on the line 8 8 of Fig. 4; Fig. 9, a detached view of one of the pawls that actuates the ribbon-bobbin; Fig. 10, a detail view showing the carriage-rack and the feed-ing pawl or dog; Fig. 11, a detail plan view showing part of the platen-carriage; Fig. 12, a detail view of the slotted bifurcated ribbon-carrier through which the ribbon is to be

threaded and by which it is carried over the printing-point on the platen; Fig. 13, a detail longitudinal sectional view illustrating the action of the printing-levers and type-bars; 5 Fig. 14, a similar view looking in the opposite direction, showing the action of the keys for shifting the platen in a plane oblique to a vertical transverse plane passing through the machine between the type-bars and the 10 platen.

The frame of the machine may be of any suitable construction, and special reference thereto is unnecessary, as it is sufficiently illustrated in the drawings.

15 The various key-levers are arranged in a bank in the front of the machine, rock about a transverse bar 2 at the rear of the machine, being normally drawn to their upper position by spring 3, and lie above the universal bar 20 4 in suitable juxtaposition thereto. The universal bar 4 is mounted in the ends of arms 5, fixed at each side of the machine upon a transverse shaft 5', rocking upon suitable bearings. The type-bars 6 are arranged in a 25 frame which projects from the main frame upwardly and obliquely toward the position of the operator. It has a lower bar 7', formed in the arc of a circle, or approximately so, of approximately the axis. The type-bars are re- 30 spectively pivoted in slots in the curved bar 7' and at their upper ends normally lie upon a correspondingly-curved rest or back-stop 7<sup>2</sup>. The upper ends of the bars are respectively 35 bent laterally, so that their ends which carry the printing characters or type shall when in juxtaposition to the platen be at right angles to the axis thereof. The type-bars are thus 40 brought into a compact concave bank or series facing the platen. A projection on each type-bar adjacent to its pivot is connected by a link 8 with its corresponding key-lever 9, which extends below it and is provided with the usual finger-piece.

45 A feature of my invention is an arrangement of the key-levers 9, as indicated in the plan view Fig. 1. It will be observed that their rear or pivot ends are relatively close together and that they diverge or incline laterally from the longitudinal center line of the 50 machine. This arrangement of type-bars and key-levers brings each lever in better position relatively to its type-bar than would be the case if the type-bars were arranged as 55 shown and the levers extended straight from the rear to the front of the machine in lines transverse to the axis of the platen—that is to say, there is less torsion or lateral strain when a key-lever is by depression caused to 60 operate its type-bar through the medium of a link 8. At the same time while preserving as near as may be the proper relation of the key-lever and type-bar, as stated, a more open arrangement of the bank of keys is permissible. 65 It is obvious that if the keys were arranged in the open order illustrated in Fig. 1 and the key-levers were arranged at right

angles to the axis of the platen the point at which the link 8 is connected to its key-lever would be farther removed from the plane of 70 the type-bar than is the case in the organization illustrated in Fig. 1.

Each type-bar, it will be observed, is provided with three characters arranged in a line which is at right angles to the axis of the 75 platen when the type-bar is approached to the printing-point. The carriage 10 at its upper or rear side runs upon a fixed transverse rod 11 and at its forward or lower side is provided with a roll 12, traveling on a fixed transverse 80 bar 13, and the plane in which the carriage is disposed is oblique to a vertical transverse plane through the machine and is illustrated as at an angle of about forty-five degrees there- 85 to. The mechanism for feeding the carriage may be of any suitable well-known kind and the particular mechanism herein illustrated is hereinafter described.

The frame 14, in which the roller-platen 15 has its bearings, is mounted in two parallel 90 links 16 16 at each end of the carriage. The two corresponding pivoted links 16 at the rear of the platen-frame are fast to a rock-shaft 17, mounted in the carriage, while the two corresponding pivoted parallel links at the front 95 of the platen-carriage are rigidly connected with a rock-shaft 18, turning in suitable bearings in the end pieces of the carriage. Centrally fixed to this rock-shaft is a downwardly- 100 extending arm 19, having at its end a roller 19' and a portion 20 extending from the opposite side of the rock-shaft 18, and coming against the front cross-bar 10', Fig. 3, of the carriage constitutes a stop that limits the 105 movement of the platen-frame toward the pivots of the type-bars. This is the normal position, and when a key-lever is depressed, Figs. 3 and 13, the type-bar is swung about its pivot and the character nearest its pivot strikes against the platen at the printing-point. The 110 platen has two other positions at greater distances from the type-bar pivots, and two shifting-keys 21 22 are provided for effecting these movements. These levers are arranged at the 115 left side of the machine and have different depths of movement, being respectively limited by suitable stops 21' 22', Figs. 4 and 14, or in any other suitable manner. Each key-lever 21 22 lies over the pin 23, projecting from an 120 arm 24, attached to a rock-shaft 25, which has arms 26 extending therefrom at or near its ends and connected by cross-bar 27, that normally is in contact with the roller 19' in the end of the arm 19, attached to the rock-shaft 18, to which are connected the parallel arms 125 16 16 at the front of the platen-frame. When the key-lever 21 is depressed, the cross-bar 27 coming against the arm 19 causes the platen-frame to move backwardly on its parallel link-supports to the position indicated in Fig. 14, 130 (the extent of the movement being limited by the stop 21' or otherwise,) and the printing-point on the platen is brought into position to receive the impact of the middle type or char-

acter on the type-bar. When the key 22 is depressed, since it has a greater extent of movement, the platen-frame will be carried upon its parallel link-supports still farther to the rear and to such position that the outer character of the three upon the type-bar will impinge against the platen at the printing-point.

The slight displacement of the line of travel of the platen from a straight line during the movement of its carriage requires no special provision in the construction of the machine to accommodate the movement of the key-levers and type-bars relatively thereto.

At each end of the lower bar 7' of the type-bar frame I mount a plate or bar 28, the ends of which are in close juxtaposition, being only separated sufficiently to permit the ready passage between them of the ends of the respective type-bars, the space between the two arms or plates 28 being directly in line with the printing-point on the platen. The plates are curved, as at 28', so that the type-bars may be guided accurately into the space between them without shock or jar. This arrangement affords an effective guide, which insures that each type-bar will approach the platen to deliver its stroke thereupon in accurate and uniform relation thereto. The rock-shaft 5', to which the arms carrying the universal bar 4 are attached, has projecting therefrom an arm 29, bifurcated at the end to straddle a pin 30 on the free end of the feed-dog or pawl 31, which is pivoted in ears 32, projecting forwardly from the back-plate of the frame, Figs. 3 and 10.

The rack 33 is mounted in a vertical position on lugs 34, arranged at the rear of the carriage by means of oblique slots 35 in the rack, through which pass bolts 36, projecting from the lugs. The rack is held in its downward position in operative relation to the feed-pawl by a spring 37, attached at one end to the rack and at the other end to the carriage. A thumb-lever 39, pivoted at 40 in a post or lug at the left-hand end on the carriage-frame, projects into an aperture in the end of the rack, and by the pressure of this thumb-lever toward the carriage the rack is caused to travel obliquely upwardly by reason of the slots therein away from and out of operative connection with the feeding-pawl, and when the rack is so moved the carriage may be run freely back and forth upon its guides or ways.

The line-spacing devices are shown in Figs. 2, 4, and 5. A thumb-lever 41, pivoted in a block 42 on the outer side of a left-hand end plate of the platen-frame, extends inwardly through or under the end plate and bears upon an arm 43, pivoted on a post 44, projecting from the inner face of this end plate. This arm has pivoted to it a pull-pawl 45, having a pin 46, which is connected to a pin 47 on the inner face of the end plate of the frame by a spiral spring, Fig. 5. When the thumb-lever is pressed inwardly, it depresses

the arm 43, and the hooked end of the pawl 45 engages the ratchet-wheel 46' and partially revolves the platen. The extent to which the inward movement of the thumb-lever 41 is permitted determines whether the pawl shall move the ratchet-wheel attached to the platen-roll through the distance of one or two teeth. If the movement is unobstructed, the movement is through two teeth of the ratchet; but by interposing a stop between the thumb-lever and the end plate of the frame the throw of the lever may be so limited as to cause the pull-pawl to move the ratchet but one tooth. Such a stop is shown more particularly in Fig. 2, where it is marked 47. It is in the form of a right-angular piece pivoted on a stud projecting from the end plate and having a handpiece 47', by which it is moved, and a portion 47<sup>2</sup>, which may be moved into the path of the thumb-lever to act as a stop to limit its movement. The ratchet-wheel and platen are held at each step of their movement by an ordinary bank-spring 48, which is preferably provided with a small roller 49, that engages the teeth of the ratchet.

The ribbon mechanism is as follows: On the inside of the frame, at each side, is journaled a bobbin-shaft 50, carrying at its upper end a bobbin 51 and at its lower end a ratchet-wheel 52. The ribbon A passes from one bobbin to the other through a bifurcated carrier 53, Figs. 1, 3, 12, 13, and 14, which is normally retracted, so as not to cover the printing-point on the platen. The carrier 53 is pivoted to a lever 54, pivoted on a cross-bar 55, extending between the side plates of the machine. Beneath the universal bar 4 is a lever 56, which is pivoted on the inner face of the slotted or comb plate 57, in the slots of which the key-levers lie and are guided. The rear end of the lever 56 is connected by a link 58 with a lever 59, pivoted to an arm 60, projecting from the rock-shaft 25. The end of the lever 59 carries a pin that projects over the end of the lever 54, to which the ribbon-carrier is pivoted. When, therefore, a key-lever is depressed, it acts upon the universal bar 4, which in turn depresses the lever 56, and the lever 59 is drawn down by the link 58, the pin on the lever 59 engaging one end of the lever 54. The ribbon-carrier being pivoted to the opposite end of the lever 54 is thus moved upwardly to carry the ribbon over the printing-point on the platen, which operation occurs before the impact of the character upon the type-bar corresponding with the key-lever that has been depressed. The ribbon is therefore normally away from the printing-point of the platen, and the writing upon the paper is fully exposed. At the moment of impact of the character on the type-bar, however, the ribbon has been advanced to cover the printing-point. This operation occurs when the platen is in either of the three positions—namely, the normal position or the second

position, due to the depression of shifting-key 21, or the third position, due to the depression of shifting-key 22.

It will be observed that when a shift-key is depressed the shaft 25 is rocked and the end of the arm 59 advances toward the axis about which the lever 54 rocks. In whatever position the arm 59 stands it receives substantially the same extent of movement downwardly when a key-lever is depressed. Hence if the platen is in the normal position and the pin in the arm 59 is in its farthest position from the axis 55 a motion will be imparted to the ribbon-carrier sufficient to carry the ribbon over the printing-point. When the platen has been shifted to its second position, the pin on the arm 59 will have approached the axis 55, and consequently may impart to the ribbon-carrier a greater extent of movement sufficient to carry it from its normal position over the printing-point on the platen. Similarly when the platen is in its third position a still greater extent of motion may be imparted to the ribbon-carrier sufficient to carry it over the printing-point on the platen by reason of the still closer proximity of the pin on the arm 59 to the axis 55. Of course I would, as shown in the drawings or otherwise, give such shape to the upper edge of the lever 54 upon which the pin acts as to cause these movements of the carrier to properly occur in the different relative positions of the arm 59 and lever 54. In order, however, to relieve the key-levers of the additional work of imparting to the ribbon-carrier the increased extent of movement when the platen occupies a position other than the normal one, I may cause the platen as it is shifted to carry the ribbon-carrier along with it, so that the normal position of the ribbon-carrier relatively to the printing-point in any position of the platen is maintained and a uniform extent of movement be imparted to the ribbon-carrier on the depression of a key-lever. To accomplish this, I provide a loose connection between the obliquely-shifting platen-frame and the ribbon-carrier, which may consist of the cross-bar 61 of the platen-frame and a projection 62 on the under or rear face of the ribbon-carrier.

So far as I am aware I am the first to provide a ribbon-carrier to which a variable extent of movement is imparted on the depression of the key-lever according to the position occupied by the platen, and also so far as I am aware it is new to accomplish this by providing a variable leverage operating substantially in the manner described.

The ribbon is fed from either bobbin to the other at will as follows: At each side of the machine the arms 5, carrying the universal bar 4, are connected by a link 63 with a right-angle lever 64, pivoted at 65 to the side plate of the machine. The upper end of this lever carries a pawl 66, (shown in detail in Fig. 9,) having an edge or tooth 67, adapted to engage the ratchet-wheel 52 of the bobbin-shaft. A

spring 68 tends constantly to draw the pawl 66 downwardly. Above the tooth 67 of the pawl is a projecting arm 69, between which and the tooth is a cam-piece 70, (one at each side of the machine,) carried by a transverse shaft 71, which has upon one end at the outer left-hand side of the machine a lever 72, adapted to be set in either of two positions. In one position the rise of one of the cams 70 comes under the arm 69 of the pawl and keeps the pawl elevated, so that its tooth 67 engages the ratchet-wheel 52. The fall of the other cam comes under the arm 69 of the other pawl and permits its spring 68 to draw it downwardly, so that its tooth 67 misses its ratchet-wheel. Upon each depression of the universal bar the lever 64 is vibrated, and the ratchet-wheel of one of the bobbin-shafts is actuated while the other is out of gear. The movement may be reversed to wind the ribbon in the opposite direction by the manipulation of a lever 72.

In some instances springs for returning the parts to normal position after their actuation are illustrated and in others they do not appear in the drawings. In every instance, however, suitable springs to assist or permit proper actuation of the various parts will be provided, and these springs may be of any suitable character and located in any suitable way.

The paper-guide 73, Figs. 1 and 3, is secured to the rock-shaft 74, turning in the end plates of the platen-frame. It is slotted where it passes around the under side of the platen at two or more points, and rolls 75, carried by spring-arms 76, attached to the back of the plate 73, project into the slots and bear upon the platen. The front or lower edge of the plate which passes around under the platen conforming thereto is cut away, so as to leave curved projections or arms 77, shaped to conform to the platen, and to these arms are attached brackets, in which a shaft 78, carrying friction-rolls 79, loosely revolves. To the front of the platen-carriage is attached a bent-wire frame or bail 80, whose ends are mounted to turn in the end plates of the platen-frame and which is by a spring 81 pressed against or toward the platen. The paper may be passed down in front of the shield or guide 73 and between it and the platen under the rolls 75 79, and thence up around the platen and under the bail 80. The carriage is of course provided with the usual spring-drum.

The key-levers 9 are recessed in their upper edges at 9'. The transverse bearing-bar 2 lies in these recesses, and the levers are drawn up against it by their springs 3. This arrangement facilitates the assembling of the machine and permits the ready removal and replacement of any one or more of the levers without disturbing the bar 2. The levers work in and are guided by the rear slotted plate 2', Fig. 1, and the forward slotted plate 57, Figs. 1, 13, and 14.

Of course this invention is not confined to an organization in which the platen is shifted

to different positions in the same direction from the normal position, but is equally applicable to a construction in which the platen is shifted in opposite directions from a normal central position.

My improved machine is characterized by great simplicity of structure, making it compact and affective in operation, not liable to get out of order, and not liable to be materially effected by relatively-extended use. This will be apparent from the drawings and the foregoing description.

The general subject-matter embodied in an organization other than that claimed herein and comprising a platen movable endwise and also transversely in a plane oblique to the horizontal plane of the machine, means for at will moving the platen transversely, type-bars pivoted in front of the platen and each having more than one character thereon, horizontally-disposed key-levers pivoted at the rear of the machine and extending forward under the platen and type-bars, and connections between each key-lever and its corresponding type-bar is claimed by me in another application, Serial No. 3,674, filed February 2, 1900.

I claim as my invention—

1. The combination of an endwise-movable carriage, a platen mounted thereon and movable transversely to the line of travel and obliquely to the horizontal plane of the machine, means for at will so moving the platen transversely, a series of pivoted horizontally-disposed key-levers extending under the carriage and to the front of the machine, a series of type-bars pivoted in front of the platen below the horizontal plane thereof and normally inclined away from the platen toward the front of the machine, two or more characters on each type-bar and a link directly connecting each type-bar and its corresponding key-lever.

2. The combination of an endwise-movable carriage, a platen mounted thereon and movable transversely to the line of travel and obliquely to the horizontal plane of the machine, means for at will so moving the platen transversely, a series of horizontally-disposed key-levers radially arranged pivoted at their rear ends at the rear of the machine and extending under the carriage to the front of the machine, a series of type-bars each pivoted in a fixed support in front of and below the plane of the platen and normally inclined away from the platen toward the front of the machine, the pivots being arranged in a curve or arc occupying a less width of space than the key-levers above which they are arranged, a link directly connecting each key-lever and its corresponding type-bar and two or more characters on each type-bar.

3. The combination of a carriage traveling endwise upon fixed rails or supports, a platen mounted thereon and adapted to be shifted from its normal position transversely to its axis in a plane oblique to the horizontal plane of the machine, a series of type-bars each piv-

oted upon a stationary frame or support at their lower ends in front of and below the level of the platen and normally lying at rest inclined from the pivots away from the platen and toward the front of the machine and having each three characters on its upper end, a series of character key-levers horizontally arranged, pivoted at the rear of the machine, extending forward under the carriage and type-bars and respectively operatively connected with their corresponding type-bars by direct link connections, two shift-keys pivoted at rear of machine, extending to the front and depressible different distances, a pin or shaft operated upon by said keys to be moved a different distance according to the key depressed, a correspondingly-operated rock-shaft, a cross-bar or bail movable therewith, and operative connections between said bail and the transversely-movable platen, substantially as set forth.

4. The combination of a carriage traveling endwise upon fixed rails or supports, a platen mounted thereon and adapted to be shifted transversely to its axis in a plane oblique to the horizontal plane of the machine from its normal position to either of two other positions, a series of type-bars each pivoted at its lower end upon a stationary frame or support in front of and below the level of the platen and normally lying at rest inclined from the pivots away from the platen and toward the front of the machine, a series of character key-levers horizontally arranged, pivoted at the rear of the machine and extending forward under the carriage and type-bars, a link directly connecting each key-lever and its corresponding type-bars, two similarly pivoted and arranged shift key-levers, operative connections between the shift key-levers and the transversely obliquely movable platen, and three type or characters on each type-bar, substantially as set forth.

5. The combination of an endwise-movable carriage, a platen-frame carried thereby and movable transversely to the line of travel of the carriage and obliquely to a vertical transverse plane through the machine, a platen carried by the frame, two shift-keys, mechanism interposed between the frame and the shift-keys whereby upon the operation of one shift-key the platen-frame is moved a definite distance from its normal position and upon the operation of the other shift-key it is moved another definite distance from its normal position, type-bars having multiple characters, horizontal key-levers pivoted at the rear of the machine and extending forward under the carriage and type-bars, and direct link connections between the key-levers and type-bars.

6. The combination of one or more shift-keys, a rock-shaft 25, an arm 24 extending therefrom and having a projection or part acted upon by the shift-keys, arms projecting from the rock-shaft, a cross-bar 27 connect-

ing them, an endwise-moving carriage arranged in a plane oblique to the horizontal plane of the machine, a platen-frame mounted upon the carriage and capable of being moved  
 5 transversely to the line of travel of the carriage in a plane oblique to the horizontal plane of the machine and operative connections between the platen-frame and the cross-bar 27  
 10 whereby upon the operation of a shift-key the platen-frame may be obliquely shifted for the purpose set forth.

7. The combination of an endwise-movable carriage, a platen mounted thereon and movable transversely obliquely to the horizontal  
 15 plane of the machine, a series of pivoted type-bars each having three characters thereon, a series of key-levers horizontally arranged, pivoted at the rear of the machine and extending forward under the carriage and type-  
 20 bars, a direct link connection between each key-lever and its corresponding type-bar, two shift-keys horizontally disposed and pivoted at their rear ends at the rear of the machine and operative connections between each  
 25 shift-key and the obliquely-movable platen whereby upon the depression of one shift-key the platen is moved from its normal position to a second position and on the depression of a second shift-key is moved to a third  
 30 position.

8. The combination of a platen movable endwise and transversely in a plane oblique to the horizontal plane of the machine, means  
 35 for at will moving the platen obliquely transversely, a series of type-bars pivoted in front of the platen and each having more than one character thereon, a series of horizontally-disposed key-levers pivoted at the rear of the  
 40 platen and type-bars and a direct link con-

nection between each key-lever and its corresponding type-bar.

9. The combination of a platen movable endwise and transversely in a plane oblique to the horizontal plane of the machine, means  
 45 for at will moving the platen transversely, a series of type-bars whose pivots are arranged in a single arc in front of the platen and each having on its upper end more than one character, a series of horizontally-disposed key-  
 50 levers pivoted at the rear of the machine and extending forward under the platen and pivots of the type-bars, and direct link connections between each key-lever and its corresponding type-bar.  
 55

10. The combination of a platen movable endwise and transversely in a plane oblique to the horizontal plane of the machine, two shift-keys, operative connections between  
 60 each shift-key and the transversely-movable platen whereby on the depression of one key the platen may be moved transversely from its normal position into another definite position and on the depression of the other shift-  
 65 key be moved from its normal position to still another definite position, a series of type-bars having their pivots arranged in a single curve or are in front of and below the platen, three  
 70 characters on the upper end of each type-bar, a series of horizontally-disposed key-levers pivoted at the rear of the machine and extending forward under the platen and type-  
 bars, and a direct link connection between each key-lever and its corresponding type-bar.

In testimony whereof I have hereunto sub-  
 75 scribed my name.

HERBERT C. HESS.

Witnesses:

F. G. RING,  
 C. D. LADLEY.