H. ELMBLAD.

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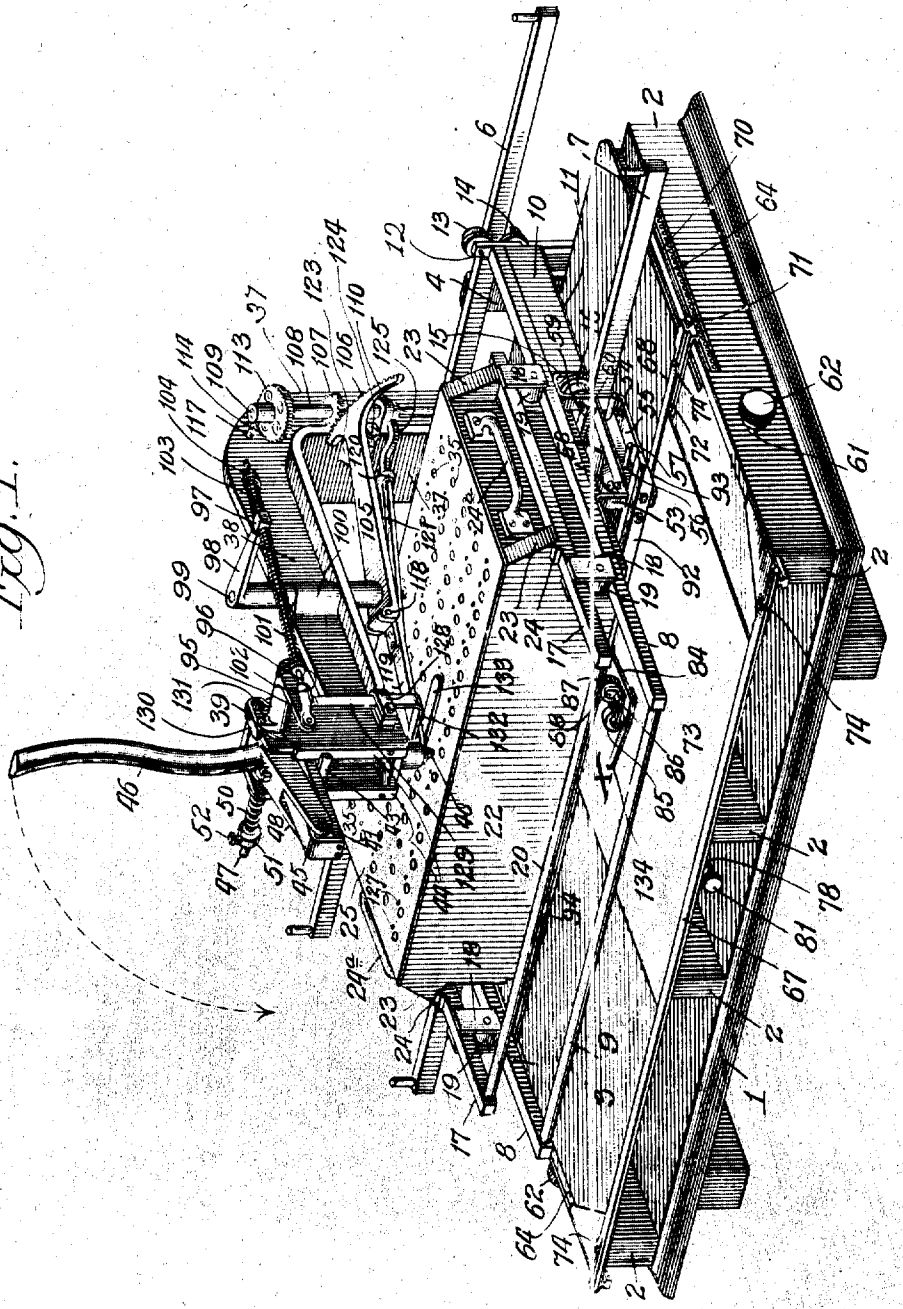
APPLICATION FILED FEB. 18, 1915.

1,221,429.

Patented Apr. 3, 1917.

10 SHEETS—SHEET 1.

Fig. 1.



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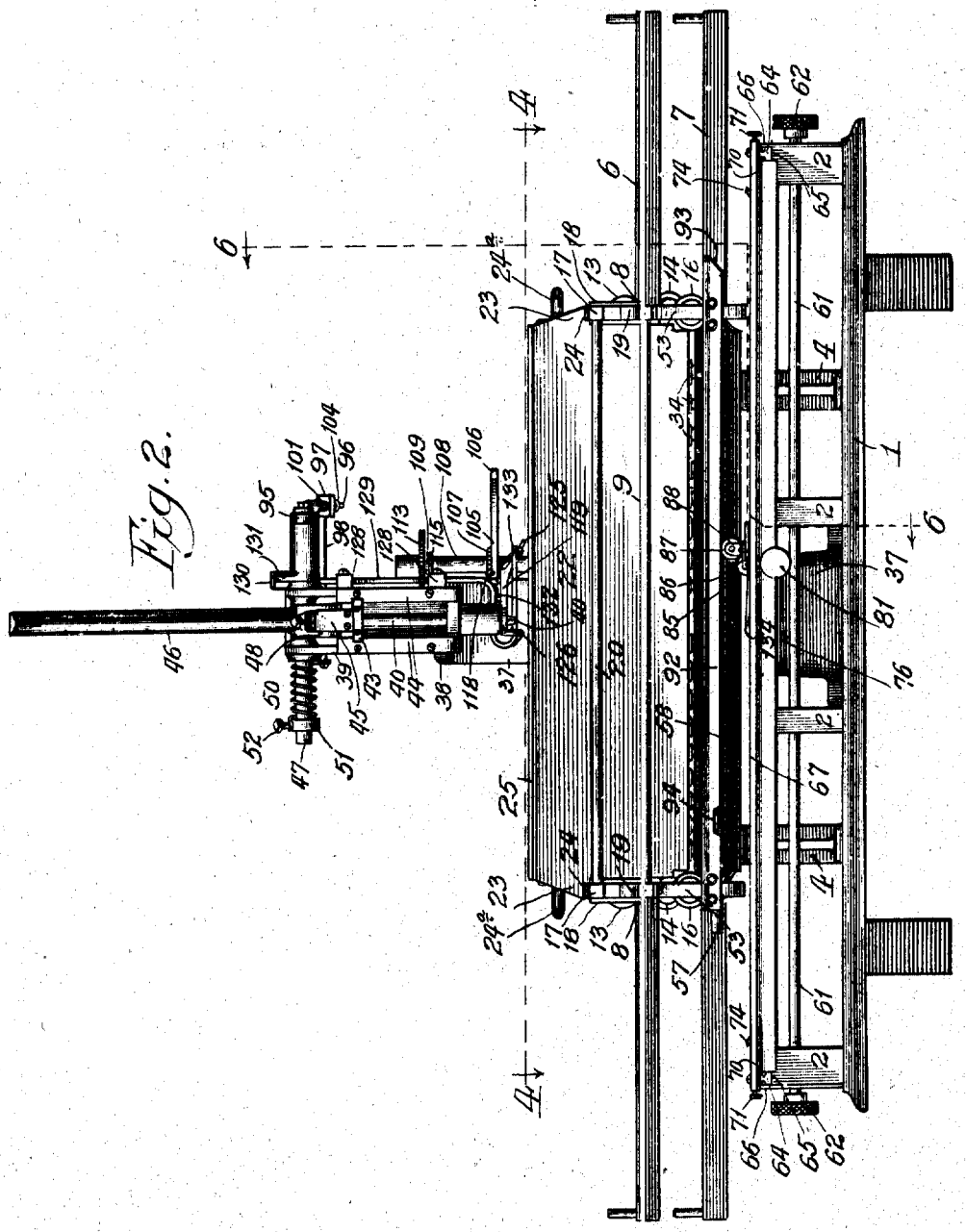
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10 SHEETS—SHEET 2.

Fig. 2.



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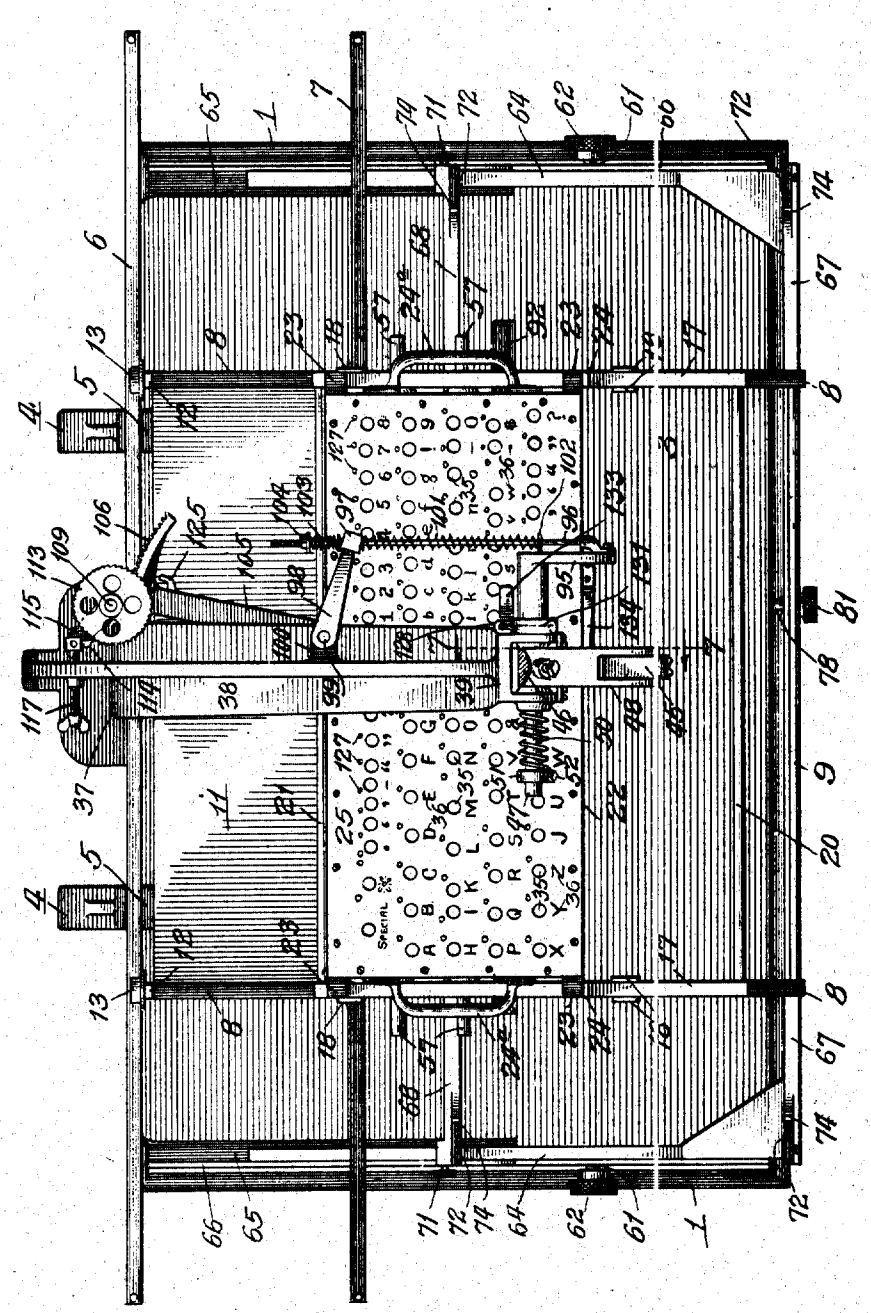
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10 SHEETS—SHEET 3.

Fig. 3.



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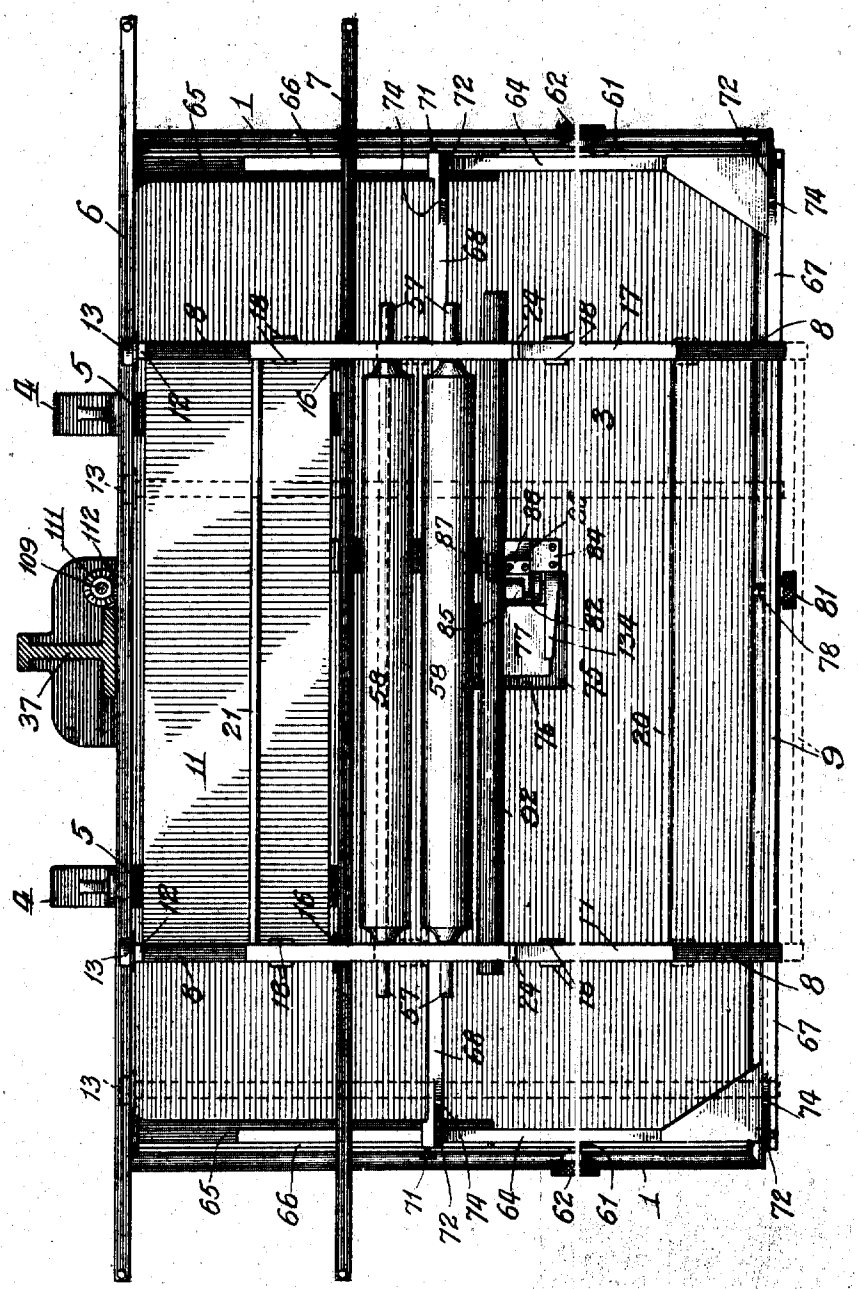
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10 SHEETS—SHEET 4.

Fig. 4.



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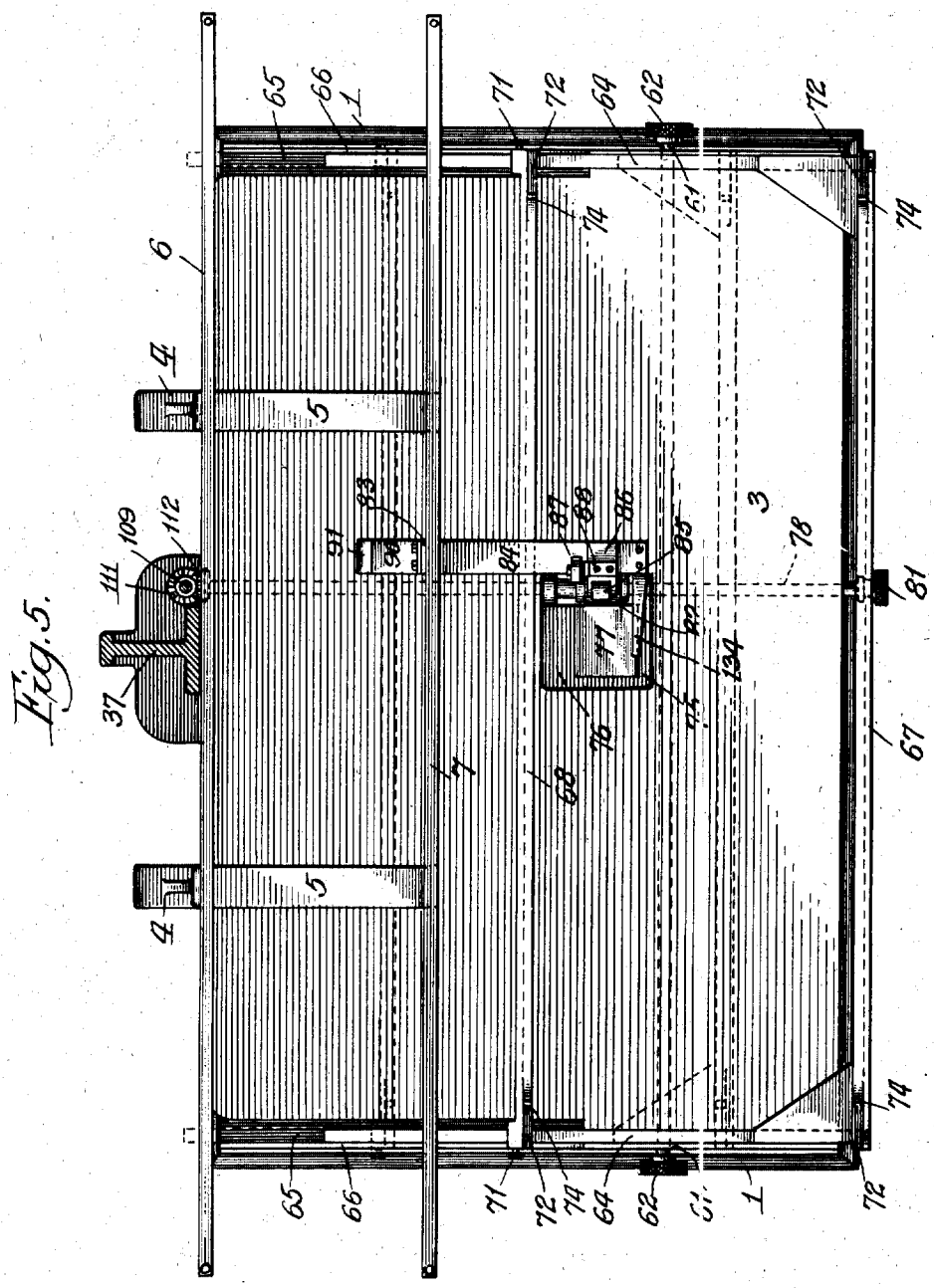


Fig. 5.

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10 SHEETS—SHEET 6.

Fig. 6.

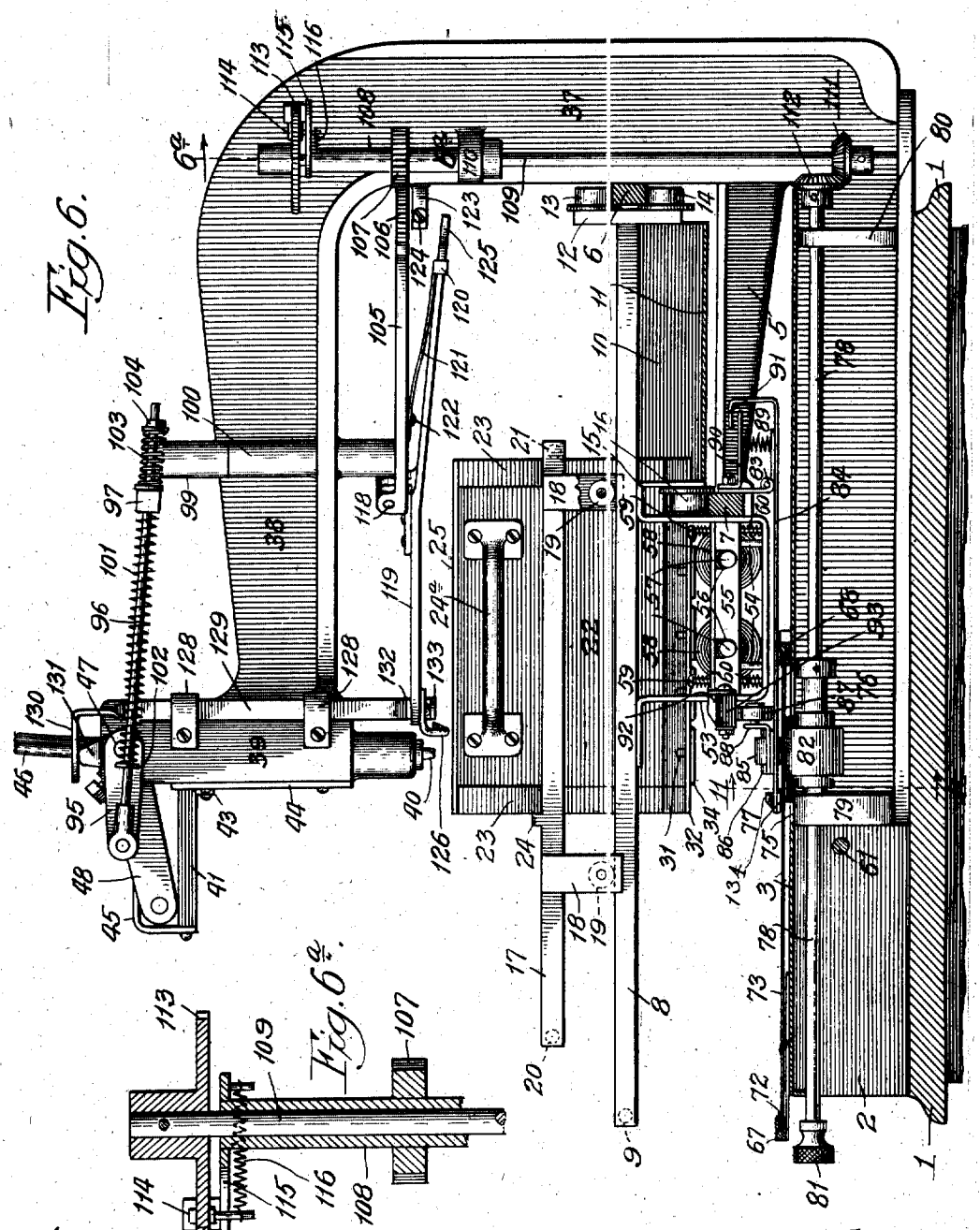


Fig. 6a.

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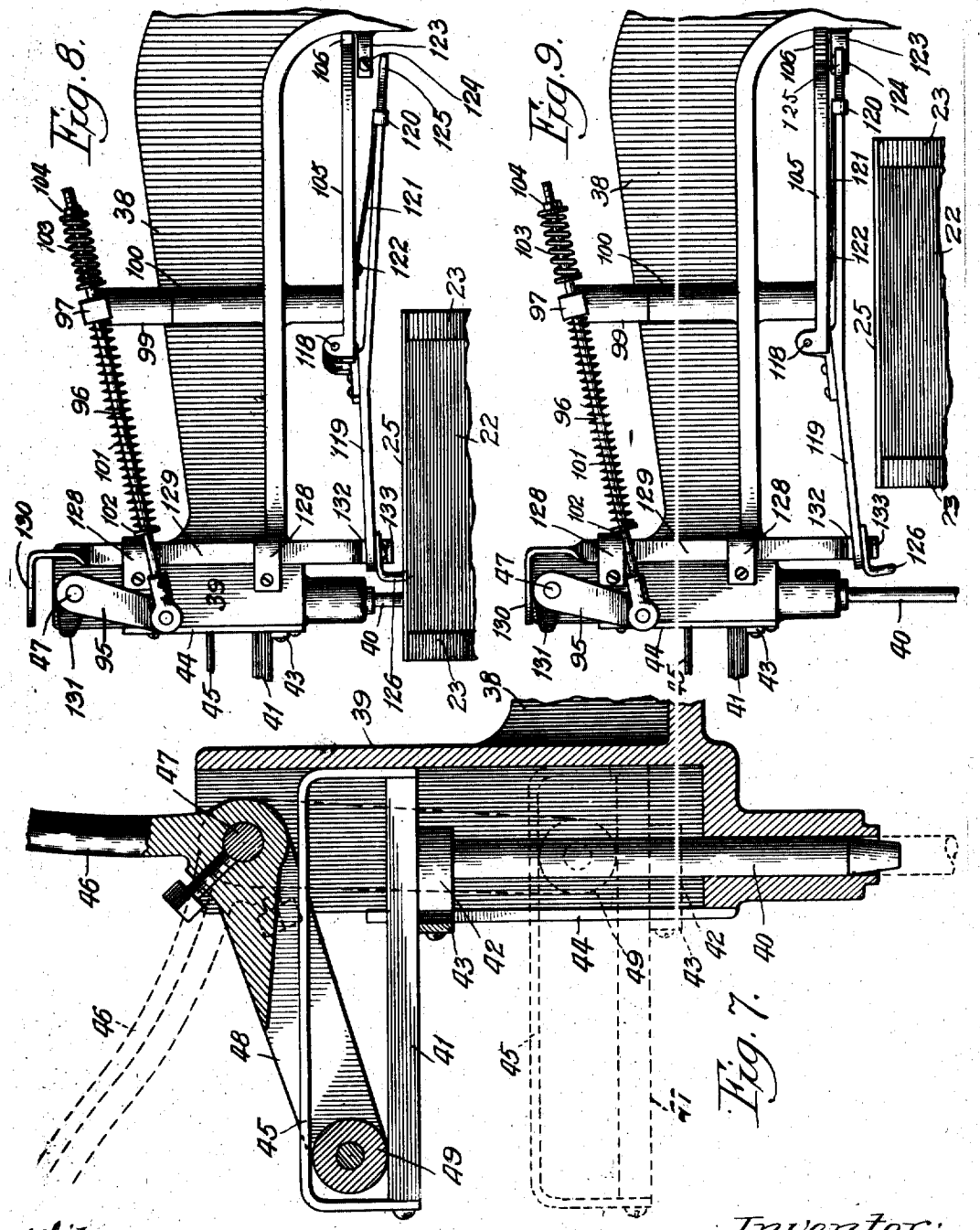
PRINTING MACHINE.

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10 SHEETS—SHEET 7.



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10 SHEETS—SHEET 8.

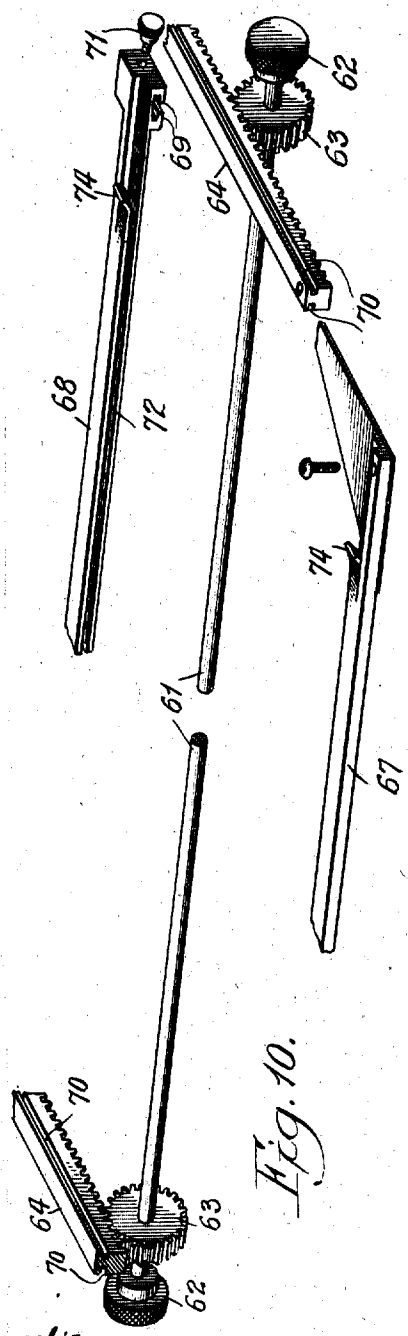


Fig. 10.

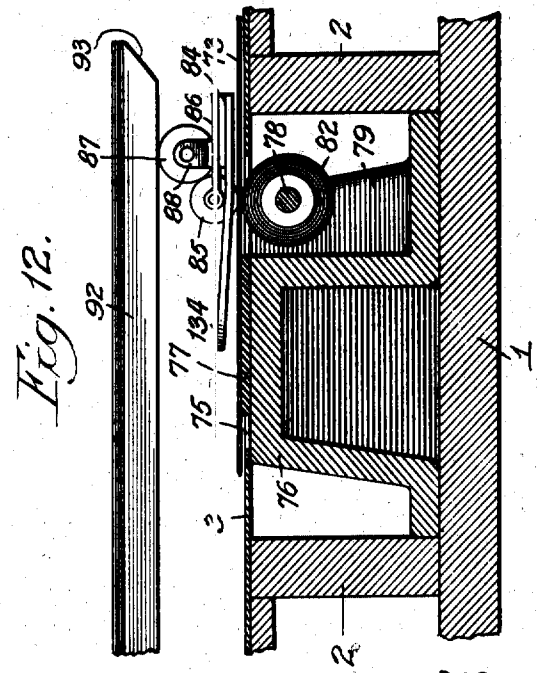


Fig. 12.

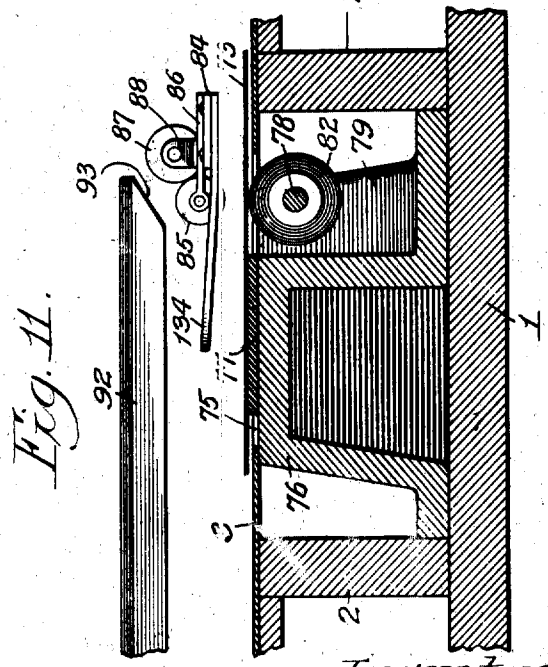


Fig. 11.

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APPLICATION FILED FEB. 18, 1915.

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10 SHEETS—SHEET 9.

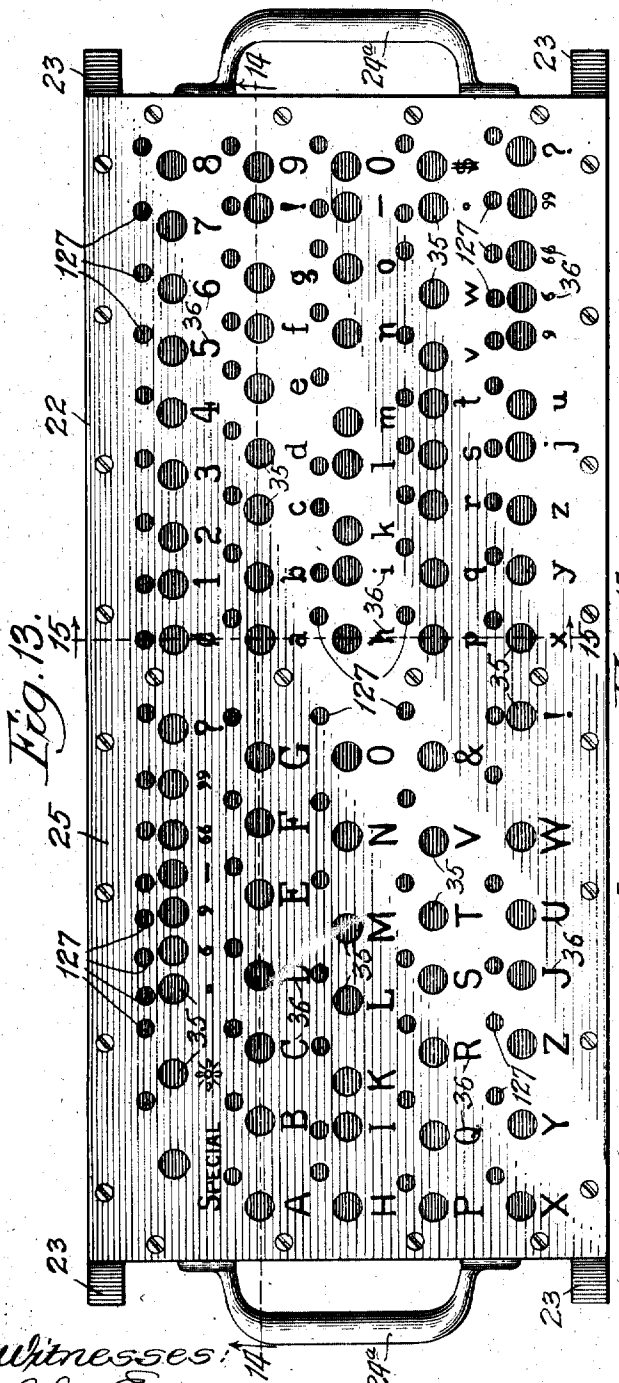


Fig. 13.

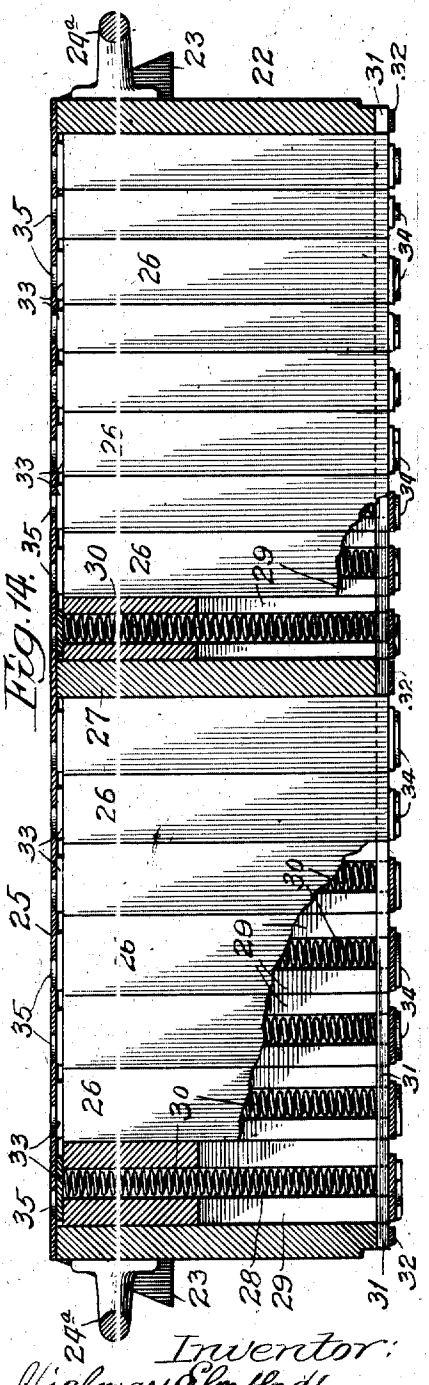


Fig. 14.

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Fig. 16.

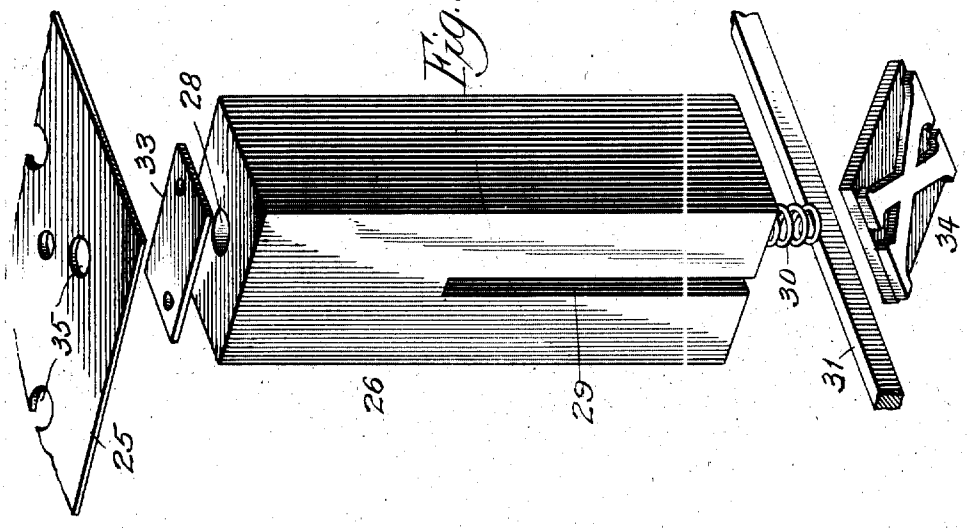
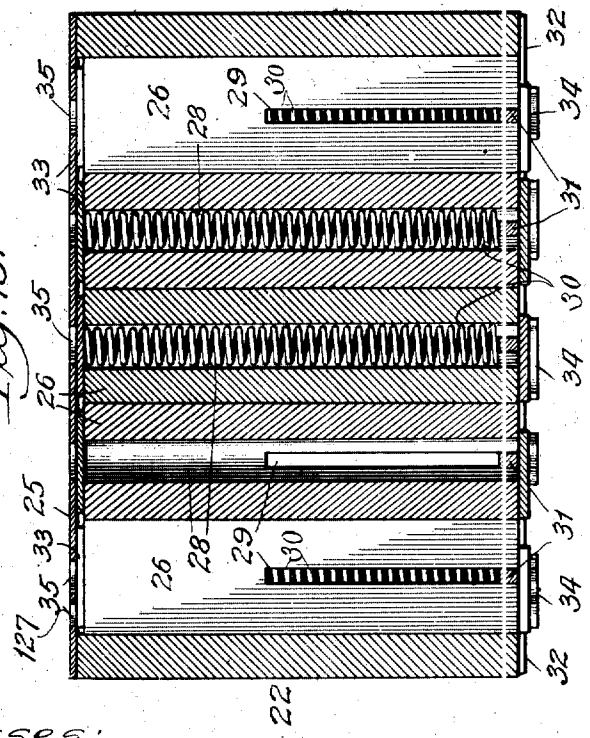


Fig. 15.



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PRINTING-MACHINE.

1,221,429. Specification of Letters Patent. Patented Apr. 3, 1917.

Application filed February 18, 1915. Serial No. 9,14.

To all whom it may concern:

Be it known that I, HJALMAR ELMBLAD, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Printing-Machines, of which the following is a description, reference being had to the accompanying drawings, forming a part of this specification, in which corresponding numerals of reference in the different figures indicate like parts.

The object of my invention is to provide a simple, cheap and effective printing machine adapted to utilize independently movable type; said machine being especially adapted for the printing of signs, placards and other analogous matter in which relatively large type are employed and so constructed and arranged that any given type may be brought into a printing position and there actuated by approved means so as to make the desired impression upon a printing surface.

To this end my invention consists in providing novel selecting, positioning, feeding, spacing and inking means and in so constructing, arranging and combining the type, type-case and carrying or supporting means therefor, that the requisite type may be successively brought to a printing position, an impression taken therefrom and the proper space provided for the succeeding impression and that whether type of uniform or varying width be employed; all of which is hereinafter more particularly described and definitely pointed out in the claims.

In the drawings,

Figure 1 is a perspective view of a printing machine embodying my invention,

Fig. 2 is a front elevation thereof,

Fig. 3 is a plan,

Fig. 4 is a horizontal section in plan taken upon line 4—4, Fig. 2,

Fig. 5 is a plan view of the base with the type-font, carriages, and other movable parts removed,

Fig. 6 is a partial end elevation, and a partial section, taken upon the line 6—6, Fig. 2,

Fig. 6^a is a section taken upon the line 6^a, Fig. 6,

Fig. 7 is a vertical section taken upon the line 7—7, Fig. 3.

Fig. 8, is a side elevation in detail of the arm which supports the operating lever and a portion of the space controlling lever in the position in which it would appear when a character is being impressed,

Fig. 9, is a like view showing the relative position assumed by said lever when the type-font is removed to an abnormal position to provide for word-spacing,

Fig. 10, is a perspective view, partially broken away, of the paper holding guide and line spacing mechanism,

Fig. 11, is a vertical sectional view in detail, taken upon the line 11—11, Fig. 6, illustrating the paper feed mechanism as it would appear when in a non-engaging position,

Fig. 12, is a like view showing the feed rollers in an engaging position,

Fig. 13, is a plan view of the font-holding case,

Fig. 14, is a longitudinal vertical section taken upon the line 14—14, Fig. 13,

Fig. 15, is a transverse vertical section taken upon the line 15—15, Fig. 13, and

Fig. 16, is a perspective view showing a portion of the positioning-plate of the type-case, together with a type character, a type body and the several parts associated therewith as they would appear when detached.

In each case in which a sectional view is shown, the direction in which the parts are viewed is indicated by an arrow.

Referring to the drawings, 1, Figs. 1 to 6, inclusive, and 11 and 12, indicates a horizontal base having transverse members 2, Figs. 1, 2, 11 and 12, extending from front to rear thereon, which serve as supports for a horizontal table surface upon which the paper may be laid for receiving printed impressions, said surface consisting, preferably, of a sheet metal plate 3.

Formed upon or rigidly attached to the base 1, are brackets, generally designated by 4, Figs. 1 to 5 inclusive, having forwardly extended arms 5, also shown in Fig. 6, arranged parallel to each other and adapted to serve as supports for horizontal track-members 6 and 7 respectively, which are arranged parallel to each other and longitudinally of the machine. The bar 6, is higher than its fellow, being supported upon upright portions of the brackets at the rear of the machine, while the bar 7 is attached to the forward ends of said arms above the paper supporting surface 3, as more clearly shown in

Fig. 6. The purpose of so elevating the bar 6, will be apparent from further description.

Mounted upon the bars 6 and 7, which serve as ways therefor, is a longitudinally movable carriage consisting of forwardly extended parallel bars 8, 8, the forward ends of which are rigidly connected by means of a rod 9. A block or member 10, Figs. 1 and 6, is placed beneath and rigidly attached to each of the bars 8, the two blocks being connected with each other by means of a sheet metal plate 11, also shown in Figs. 3 and 4, thereby forming a rigid skeleton frame. Rigidly attached to the rear end of each of the bars 8, is a vertical member 12, provided with rearwardly projecting wrist-pins upon which are mounted wheels 13, and 14, respectively, the former being above, and the latter below, while both are in rolling contact with the track-bar 6. Rigidly attached to the under face of each of the bars 8, is a depending stirrup member 15, which serves as a bearing for a carriage wheel 16, adapted to travel upon the bar 7. The several carriage wheels 13, 14 and 16 are flanged as shown for the purpose of guiding them upon the tracks.

It will be noted that the track-bars 8, extend a considerable distance forward of the supporting wheels 16; and inasmuch as the carriage described is intended to support a second carriage adapted to be moved forwardly upon said extended portion, the wheels 14, are located beneath the track-bar 6, to resist the lever action upon the track-bars 8, when the weight of the uppermost carriage is supported upon their forward ends.

Mounted upon the carriage described, is a secondary carriage having parallel frame-members 17, 17, located above and in alinement with the track-bars 8. Depending parallel plates 18, are rigidly attached to the bars 17, with their lower ends extending downwardly upon opposite sides of the bars 8. Interposed between said plates and provided with suitable bearings, are supporting wheels 19, mounted upon the track-bars 8. The bars 17 are rigidly connected at their forward ends by means of a rod 20, and at their rear ends by means of a rod 21, thereby forming an open rigid frame adapted to be moved back and forth from front to rear above the table surface or paper support 3.

A type-font case 22, is provided with lugs 23, at its ends, better shown in Figs. 1, 13 and 14, adapted to rest upon the bars 17, so as to suspend said case between them; said case being located at the rear of the frame where it is held against displacement by means of lugs 24, or other approved means upon the top of the bars 17. Handles 24ª upon the ends of the case enable it to be placed upon or removed from the machine.

I will first describe the type-case, the movable type and means for actuating the same to make an impression, after which I will describe the inking means and the means for supporting, adjusting, guiding and feeding the paper, including my improved means for justification, and for automatically regulating the spacing to conform to the varying widths of type used in a given font.

The type-case 22, consists of a quadrilateral box-like receptacle, open at the bottom and closed at the top by means of a combined type selecting and positioning-plate 25, presently to be described. The bodies of the several type, generally designated by 26, Figs. 14, 15 and 16, are rectangular in cross-section and uniform in length and thickness, but vary in width according to the character represented to conform substantially to the usual well known standards. The case is divided into two compartments by means of a partition 27, Fig. 14, so as to form two compartments, the one at the left being for the reception of "upper", and the one at the right for that of the "lower-case" type, and such other characters as may be desired. Each type body is provided with a central bore 28, and a transverse slot 29, Figs. 14, 15 and 16. The bore is provided for the reception of a restoration spring 30 for holding the type in a normal position, while the slots 29 are for the reception of cross-bars 31. The cross-bars are arranged parallel to each other and from end to end of the case, being embedded in notches at the bottom of the latter and held in place by means of sheet-metal cross-strips 32, screwed to the bottom of the end-pieces and to that of the partition 27, as shown in Figs. 6, 14 and 15.

Rigidly attached to the top of each type body is a metal bearing-plate 33, against which the upper end of the spring 30 rests, while the lower end is adapted to bear against the cross-bar 31, thereby enabling the spring, which is under the requisite normal tension, to hold the upper end of the type-body against the plate 25. The length of the slot 29 is sufficient to enable the type body to be forced downwardly a sufficient distance to make an impression. Formed upon or attached to the lower ends of the type bodies, are the characters or type faces 34, which are beneath the cross-bars 31.

Formed in the selecting-plate 25, are a series of perforations or bores 35, which conform respectively to the relative positions of the type and are concentric therewith, the purpose of said perforations being to position the type above a predetermined point, upon a platen, and to permit of the descent through said plate of a plunger for causing a type impression. Each perforation 35 is designated by means of a character placed in proximity thereto which corresponds to that upon the type beneath. The designating characters 36, Fig. 13, are preferably

arranged to correspond substantially to the relative location of type in a printer's case.

The following described means is employed for actuating the type: A bracket having an upright portion 37, and a forwardly extended arm 38, Figs. 1, 3, and 6 to 9, inclusive, is rigidly attached to the base midway between its ends. A plunger 40, Figs. 1, 2, 6, 7, 8 and 9, is mounted in said head so as to be moved in a vertical guideway, as shown. A cam member consisting, in the example shown, of a horizontal bar 41, is rigidly attached to a head 42, Fig. 7. A cross-bar 43, is also rigidly attached to said head and adapted to bear against the outer faces of parallel guide flanges 44, to prevent rotation. A loop member 45, has its ends attached to the opposite ends of the member 41 while the body thereof is parallel therewith. An elbow lever, generally designated by 46, better shown in Figs. 1, 2, 6 and 7, is pivotally mounted upon a rock-shaft 47, in the head. The short arm 48, of said lever, is bifurcated so as to straddle the loop member 45, and is provided with a friction roller 49, Fig. 7, upon its outer end, which is interposed between the members 41 and 45, so that in actuating the lever the roller will first engage the part 41, to depress the plunger, and upon reversal, will engage the part 45, to lift it. A spiral-spring 50, better shown in Fig. 2, has one end attached to the head 39, and the other to a ring 51, adjustably secured upon said rock-shaft 47. Said spring serves to lift the plunger and to hold it normally in a raised position. When the plunger is depressed it is adapted to enter one of the perforations 35, in the selecting plate 25, so that a further movement of the lever will cause the type beneath to be moved down by the plunger which presses against the plate 33, and forces the type downwardly against the action of the restoring spring 30, therein, to cause an impression.

It will be noted that the lower end of the plunger is tapered as shown in Figs. 6 and 7, for the purpose of more readily entering the perforations in the selecting-plate in case the latter is not in exact registration. The diameter of the plunger body is substantially the same as that of the perforation so that if the latter is sufficiently near registration to permit the tapered end to enter, the further depression of the plunger will serve to correct the registration. This feature will again be referred to in describing the general operation of the machine.

The inking apparatus will now be described. It will be noted by reference to Figs. 2, 6 and 14, that the type characters 34 are adjusted to project slightly below the lower edge of the type-case, and that the faces are in a common plane in position to be acted upon by ink-rollers beneath.

Rigidly attached to the lower face of each of the bars 8 is a stirrup 53, having upwardly extending pins 54, 54, Fig. 6, formed to project loosely into bores in a horizontal bearing member 55, which is provided with notches 56, 56, adapted to receive the axle extensions 57, of parallel ink-rollers 58, 58, better shown in Figs. 4 and 6. Adjusting screws 59, Fig. 6, are tapped through the bar 55, and have their lower ends resting upon the upper face of the stirrup 53; said screws having coiled springs 60 around them between the heads and the bar 55, and between the lower face of the bar and the upper face of the stirrup, to prevent by their tension, any displacement from jar or otherwise when the screws are properly adjusted. Said screws enable the ink rollers to be readily adjusted to make proper contact with the type. Upon moving the lowermost carriage longitudinally to a central position and then moving the upper carriage back and forth at right angles thereto, the type may be brought into contact with the rollers and properly inked. The usual printers' ink, applied in any well known way, may be used for the purpose.

The paper upon which the printing is to be done, is laid upon and supported generally by the surface 3, being guided in its longitudinal movement and moved forward or back for line adjustment by means of a guide-frame mechanism which will now be described.

Journaled in the members 2, of the frame, in the manner best shown in Fig. 2, is a shaft 61, also shown in Figs. 1, 3, 4, 5, 6 and 10, which is provided with operating thumb-wheels 62, upon its projecting ends. Pinions 63, Fig. 10, are adapted to engage teeth upon the lower faces of parallel rack-bars 64, 64, located at opposite ends of the frame and arranged to slide back and forth in grooves 65, at the ends of the frame. Sheet-metal flanges 66, form the outer side walls of the rack grooves.

The rack-bars 64, are rigidly connected at their forward ends by means of a paper guide bar 67, which rests and is adapted to slide upon the surface 3. A second and like bar 68, is arranged parallel to the bar 67, and slidably connected at its ends to the rack-bars 64, by means of flanges 69, Fig. 10, which are adapted to enter and slide within grooves 70, in the sides of said rack-bars. Set screws 71, in the ends of the bar 68 enable it to be secured at any desired distance from the bar 67, when adjusted to the desired width of paper to be used. The bars 67 and 68, lying as they do upon the surface 3, and being attached to the rack-bars so as to support the latter, serve to keep the upper faces of said rack-bars flush with the surface 3, so as not to interfere with the ends of paper sheets which may be moved

across them. The bars 67 and 68, are provided with counterpart longitudinal grooves 72, Figs. 1, 3, 4, 5, 6, and 10, adapted to receive the opposite edges of a paper sheet 73, in the manner indicated in Figs. 1, and 6. The flanges above the paper holding grooves described are preferably cut away at the respective ends and slightly bent upwardly as shown at 74, to facilitate the introduction of the paper to said grooves.

Inasmuch as each type is intended to be presented at a given point, it follows that the paper must be moved laterally within the guides with each type impression, while for line spacing, the paper-guide frame may be moved to the desired extent back or forth by the turning of the thumb-wheels 62.

In order to provide for a suitable platen and the requisite paper feed mechanism, an opening 75, Figs. 4, 5, 6, 11 and 12, is formed in the table or part 3, around the point chosen as the printing-position, beneath which opening is rigidly secured a block or platen support 76, also shown in Fig. 2, which consists, preferably, of a metal casting rigidly attached to the base 1. A platen 77, formed from a suitable elastic material, is mounted upon the block 76, the surface of said platen being slightly raised above the level of the part 3, to insure the proper impression without injury to the paper.

The paper sheet may be fed by hand, if desired, by merely pushing it from right to left after each successive impression, and any arbitrary means may be employed for determining the relative character and word spacing; but I prefer to cause the feeding to be done automatically and for this purpose have provided the following described means.

A shaft 78, mounted in bearing members 79 and 80, better shown in Fig. 6, is extended from front to rear of the machine beneath the part 3, and in alinement with a portion of the opening 75, said shaft being provided with a knob 81, at the forward end for manual operation.

A friction roller 82, is rigidly mounted upon the shaft 78, the periphery of which is adjusted to contact with the under surface of the paper sheet 73, as shown in Fig. 6, to feed it when the shaft is rotated.

Rigidly attached to the track-bar 7, is one leaf of an ordinary hinge 83, better shown in Figs. 5 and 6, while to the other leaf is attached a flat bar 84, also shown in Fig. 1, which is arranged horizontally above the plate 3, and parallel to the plane of the shaft 78. A roller 85 is mounted upon a clip 86, attached to the bar 84, and extended laterally therefrom so as to position said roller directly above the feed-roller 82. A like roller 87, is mounted upon a clip 88, rigidly attached to the clip 86, said roller being located in a plane above that of the roller 85, for the purpose hereinafter stated. A coiled spring 89, Fig. 6, is interposed between the rear end of the flat bar 84, and a stationary clip 90, also shown in Fig. 5, which is rigidly attached to the track bar 7. The tendency of the spring is to tilt the rear end of the bar 84, downwardly and thereby lift the forward end, and with it the counterpart feed-roller 85, so as to prevent it from pressing downwardly upon the paper when the lower or main carriage is not in a printing position. The rear end of the bar 84, is bent upwardly and thence forwardly over the clip 90, as shown at 91, Figs. 5 and 6, for the purpose of limiting the action of the spring 89. In order to cause the roller 85 to be held downwardly so as to contact with the paper sheet and press it against the feed-roller 82, I provide a horizontal bar 92, Figs. 1, 2, 3, 4, 6, 11 and 12, which is arranged to extend lengthwise of the lower carriage and is rigidly attached to the stirrup 53. The height of the lower face of the bar 92, is such that when in contact with the roller 87, it will cause the roller 85 to be pressed down against the paper which is adapted to rest upon the feed roller 82, with sufficient force to cause the feeding of the paper when the roller 82 is rotated. The tension of the spring 89, serves to hold the roller 85, out of contact with the paper when the bar 92 is not acting to press it down, as in Fig. 11, but when said bar is moved thereover, as in Fig. 12, the roller 85 is in feeding contact with the paper. Said bar is beveled at its right hand end, as shown at 93, to enable it to engage and depress the roller 87, when the lower carriage is moved from an extreme lefthand position toward the right, and is provided with a noteh 94, Fig. 2, near its left-hand end, which is brought above said roller when the lower carriage is moved to an extreme right-hand position to enable the feed pressure to be released. Thus it will be seen that when the lowermost or longitudinal carriage is in either extreme position at right or left, the paper is disengaged and is free to be adjusted by hand, but at all other times it is gripped by the feed rollers.

Were it desirable to feed the paper by hand, it is obvious that a scale might be indicated upon the surface 3, that would enable the operator to move the paper to the desired extent to provide the relative spacing for the characters, words or paragraphs. This would be comparatively simple, especially were characters of uniform width to be employed, as in a typewriter, but the variation in the width of printers' type in ordinary use would render such a method undesirable. I prefer, therefore, to provide means for automatically spacing which may be accomplished as follows:

Rigidly attached to the right-hand end of

the shaft 47, is a crank 95, Figs. 1, 2, 3, 6, 8 and 9, to the free end of which is jointedly connected a rod 96, arranged to pass loosely through a bore in a member 97, which has a pin, not shown, loosely swiveled in a well known way in a longitudinal bore in a crank arm 98, attached to the upper end of a vertical shaft 99, journaled in a bearing 100, upon the arm 38. A coiled spring 101, is interposed between a rigid stop 102, on the rod 96, and the member 97, while a shorter and somewhat stronger spring 103 is interposed upon said rod between the member 97, and an adjusting nut 104, upon the rear end of said rod.

The lower end of the shaft 99, is rigidly attached to a swinging arm 105, having a segmental rack 106, upon its rear end, in engagement with a pinion 107, upon a sleeve 108, loosely mounted upon a shaft 109, journaled in a bearing 110, Fig. 6, on the bracket 37, and at its lower end in a suitable step-bearing, as shown in said last named figure. A beveled pinion 111, also shown in Figs. 4 and 5, is keyed to the shaft 109, and is in engagement with a like pinion 112, better shown in Fig. 6, upon the shaft 78.

Keyed to the upper end of the shaft 109, is a disk 113, having fine ratchet teeth upon its periphery, adapted to be engaged by a pawl 114, pivotally mounted upon an arm 115, and held in engagement with the disk by means of a spring 116. A banking screw 117, Figs. 1 and 3, is tapped through the bracket 37, and is adapted to serve as a stop for the end of the arm 115, to limit its backward movement to any predetermined point to which said screw may be adjusted for the purpose hereinafter specified.

A portion of the arm 105, is extended forward of the shaft 99, and has pivoted thereto, upon a horizontal axis, as shown at 118, Figs. 1, 2, 6, 8 and 9, a lever 119, to the rear end of which is loosely connected, by means of a loop 120, the rear end of a flat spring 121, the forward end of which is riveted or otherwise attached to the underface of the bar 105. The spring 121 tends to lift the rear end of the lever 119, and hold it in the position shown in Fig. 9, when free to do so. The lever not only has the pivotal movement indicated, but is also caused to swing with the shaft 99 as its axis. A lug 123, is formed upon the front face of the bracket and is provided with a banking-screw 124, adapted to engage a finger 125, upon the rear end of the lever 119, to limit its lateral movement in the manner and for the purpose hereinafter described.

The forward end of the lever 119, is provided with a downwardly extending finger 126, which is so positioned with reference to the type plunger 40, as to engage any one of a series of perforations 127, Fig. 13, in the selecting plate 25, according to the character which is to be actuated by the plunger. Said finger is beveled as shown, so as to limit its entry into said perforations while enabling the latter to form a banking or stop therefor, as hereinafter set forth.

Whenever the type-case is in a printing position as in Figs. 1, 2, 3, and 6, the finger 126 will stand slightly above the surface of the selecting-plate 25. The tendency is to be moved down below said level by the action of the spring 121; but it is important that means should be provided for holding it normally out of contact with the selecting-plate when the actuating lever 46 is in a normal position in order to permit a free movement of the type-case without conflict therewith. The means thus provided is as follows:

Guided in bearings 128, 128, upon the plunger head 39, is a bar 129, Figs. 1, 2, 6 and 9, the upper end of which is bent forwardly, as shown at 130, to rest upon a cam 131, formed upon the shaft 47, the normal position of which is shown in Figs. 1, 2 and 6. The lower portion of the bar 129 is bent laterally toward the left, as more clearly shown at 132, Figs. 1 and 2, thence downwardly and thence toward the right as shown at 133. Said parts 132 and 133, are arranged horizontally and parallel to each other so as to permit the forward portion of the bar 119, to pass loosely between them and to rest normally upon the part 133, the height of which is such as to normally hold the finger 126 slightly above the level of the plate 25, so as to enable the type-case, as stated, to be moved to any desired position without conflict. When the case is so positioned as to enable the plunger 40, to enter one of the perforations 35, to actuate a type, and the operating lever 46, is depressed, the cam 131, will assume the position shown in Fig. 8, thereby enabling the finger 126, to descend and rest with its point upon the plate 25, and the bar 129, will likewise descend by gravity until the part 132, will rest upon the upper face of the bar 119. At such time, as shown in Fig. 8, the rear end of the bar 119, will be in a plane below the level of the stop 124, which stop, in conjunction with the finger 125, is intended to be used only in word spacing, while the finger 126, in conjunction with the stop openings 127, is designed to act as a controlling means in character spacing. The fingers 125 and 126 function alternately in the sense that when one is in action, the other is idle. When the type case is moved back away from the finger 126, and the lever 46 depressed, the forward end of the lever 119 will descend until the part 130 is in contact with the head 39, at which time, as shown in Fig. 9, the finger 126 will be below the level of the plate 25, and the finger 125 on the rear end of lever 119, will be upon the level of the stop 124 and will through the finger 125 be

limited in its lateral movement thereby. The stop 124 is so adjusted with reference to the finger 125 as to provide for a fixed lateral movement of the lever 119 and also of the rack 106, preferably equal to what is known as an "n-space," as distinguished from the varying movement caused by the variation in the width of the different characters when the control is through the finger 126, thus providing for the proper word spacing.

As above stated, the type-case is removable so that varying fonts of type may be utilized at will by removing one case and substituting another.

The operation of the machine is as follows: Having adjusted the bar 68, forward or back with respect to the bar 67, to conform to the width of the paper sheet 73, as shown in Figs. 1 and 6, the main carriage is then moved to its extreme limit, either to the right or left, to free the roller 87, and permit the roller 85 to be lifted as shown in Fig. 11. The edges of the paper are then passed into the grooves 72, of the bars 67 and 68, and moved longitudinally until the left-hand end is at the desired distance from the platen 77, to provide for the requisite printing margin. This may readily be determined by means of a guide-finger 134, Figs. 1, 2, 3, 4, 5, 6, 11 and 12, attached to the end of the bar 84, and which is intended to indicate the left-hand edge of any given type-body, thereby designating the location, near the left-hand end of the paper, of the first character to be printed. The relative position of the line will then be determined by rotating the thumb-wheels 62, to move the racks 64 forward or back so as to determine the proper space at the top of the sheet. The main or lower carriage is then moved to a middle position, thereby causing the feed rolls 82, and 85, to be brought into operative contact with the paper. The upper carriage is then moved back and forth over the ink-rolls until the type is properly inked, after which said upper carriage may be moved forward or back and the lower one to the left or right so as to bring the desired type to the printing position. In Fig. 1, the character "x" is shown to have been printed upon the paper and the type plunger is represented as standing directly over and in registration with a perforation 35, indicated by "x" in Fig. 13. In order to show said character in the view chosen, a portion of the indicating finger 134, is broken away. Again, the operating lever 46, is represented in its normal position, from which it may be concluded that the character printed will have been moved far enough to the left to provide for the necessary space between it and the next character. It should be noted that the lever 119 is held by means of a stop formed by the loop or bend in the left hand end of the parts 132 and 133, so that it is caused to stand normally at a fixed point in the rear of and slightly at the left of the plunger as shown in Fig. 2. Being so placed at the rear, the angle of incidence would enable it to be seen apparently at the right of the plunger when viewed as represented in Fig. 1, when in fact it would appear upon the left if viewed from in front. The position indicated is chosen for the purpose of establishing an initial relation between it and the several type so that it may conform in its movements to their varying width. The relative positions of the several openings or bores 127 are designed to conform in ratio to the relative width of the type plus that of a standard space. For the narrowest type, as "I", for example, the bore would be slightly at the left of the plunger; for the widest it would be at the right and for others at proportionate distances between these two extremes, it being understood that the greater the movement of the lever 119, the greater will be that of the paper to provide for the proper spacing. In printing the character named, the adjusting finger 126, which is positioned just far enough in the rear of the plunger to be in alinement with the row of spacing perforations 127, was caused to stand slightly above the plate 25, but upon actuating the lever 46, it was permitted to descend until it was brought into contact with said plate at a point to the left of the perforation 127, nearest to the right of the perforation representing "x". Upon moving the actuating lever in the direction indicated by the arrow shown in Fig. 1, the arm 95 was moved to the position shown in Fig. 8; thereby causing the spring 96 to move the arm 98 back, and to swing the lever 119, upon its vertical axis, thus causing the finger 126, to be moved to the right while pressed downwardly against the plate 25, by the spring 121, until the finger is caused to enter the bore 127, as indicated in Fig. 8, by which its lateral movement is arrested, it being understood that the lever 119 will, when resting normally against the stop in the loop at the left-hand end of the part 132, be far enough to the left of any stop opening to permit the finger 126, when depressed, to contact with the plate 25 and then, upon further depression of the actuating lever, to move over and enter the stop opening, thereby insuring the engagement of the finger when the plunger is depressed, with any stop opening in the plate. At the same time the movement of the rack 106, will have caused the sleeve 108 to be rotated, thereby swinging the arm 115 back toward the right to a position bearing a predetermined relation to that of the bore 127, at the right of the bore represented by "x". At the instant

of reversal of the actuating lever the pawl 114, Fig. 3, is brought into positive engagement with a tooth upon the disk 113, and as the actuating lever is restored to its normal position, the resulting movement of the arm 95, to its normal position, shown in Fig. 6, causes the spring 103, to press against the part 97, and, reverse the lever 119. Such reversal serves, in turn, to actuate the shafts 109, and 78, thus rotating the feed roller 82, and feeding the paper a distance corresponding to the width of the character "x" plus the space required between it and the next succeeding character.

Assuming that the word "Mine" were to be printed, the proper movement of the two carriages would enable the bore 35, above the capital "M" to be located substantially below the type plunger. It need only be near enough to enable the tapered end to enter the bore when the depression of the plunger will cause a sufficient movement of one or both carriages to insure perfect registration. The type is depressed to the full limit of movement of the plunger and when the latter is reversed, the type is restored to its normal position as shown in Fig. 14, by the upward pressure of the spring 30, therein. The capital "M", having been printed, the carriage is moved toward the left to enable the "lower case" type to be brought into action, whereupon the plunger is successively forced downwardly into the bores indicated by the characters "i.—n.—e." respectively. It will be noted that the relative position of the spacing bore 127, with respect to the bore 35 for M, varies materially from that of the corresponding bores representing the other characters in the word; being considerably farther to the right; whereas it stands directly over the "i", and about the same distance from the "n", as from the "e", thereby taking into account the relative width of the spacing required to conform to the varying width of the type. The word-spacing, should greatly exceed the character spacing. This is accomplished by moving the type carriage back, as shown in Fig. 9, and depressing the operating lever just as if a type were being moved. The effect of this action is to permit the forward end of the lever 119, to descend sufficiently as shown in Fig. 9, to cause the finger 125 upon the rear of the lever 119, to be lifted to the horizontal plane of the banking screw 124, so that when the operating lever is depressed to its full limit, said finger will be caused to move laterally until it contacts with said banking screw, which, acting as a stop, takes the place of the stop openings used in character spacing, for engaging the finger 126 and permits of a standard movement suitable for proper word spacing; for, while the extent of the operating lever movement is always the same, when the finger 126 is brought into engagement with a stop opening, the spring 101, by its yielding action, permits the arm 95 to continue its movement while the arm 98 is held stationary. Thus the lever 119, when not limited in its lateral swing by the stop openings, is given a fixed movement upon its vertical axis, the degree of which in spacing effect, corresponds to the width of a lower "n" type. In other words, when the type case is moved back and the lever depressed, so that the finger 126 cannot engage a stop opening, a movement of predetermined extent is given to the space controlling lever, and through it and the arm 105 to the rack 106, pinion 107 and in turn to the paper feed mechanism. This action insures uniformity of word-spacing, and does not involve the action of the finger 126. In fact, the latter might be dispensed with were the spacing to be uniform, as would be the case were the type to be of unvarying width.

I do not wish to be limited to the construction shown inasmuch as it may be varied without departing from the spirit of the invention. For example, in lieu of the bores 127 in the selecting plate any suitable projections similarly located and adapted to serve as stops, might be utilized.

Having thus described my invention, I claim:

1. A printing machine comprising, in combination, a type-case open upon one face to permit type to be projected therefrom, movable type yieldingly held in a normal position therein, means for movably supporting said type-case to permit universal movement thereof in a plane parallel to that of a printing surface, means for independently actuating each type to make an impression, a platen, means for moving a paper sheet in contact therewith, space determining means upon said case in predetermined relation to each type and differentially movable means interposed between said space-determining means and said paper moving means for actuating the latter.

2. A printing machine comprising, in combination, a type-case open upon one face to permit type to be projected therefrom, said case having a selecting member upon its upper face with openings therein for the passage of type-actuating means, movable type yieldingly held in a normal position within said case, means for movably supporting said type-case to permit a universal movement thereof in a plane parallel to that of a printing surface, a type-lever for actuating each type to make an impression, a platen in operative proximity to said type, means for moving a paper sheet while in contact with said platen, space determining means upon said selecting member bearing a predetermined relation to each type, a spacing lever interposed between said space

determining means and said paper moving means and means for yieldingly connecting said spacing lever to said type-lever.

3. A printing machine, comprising, in combination, a type-case open upon one face to permit type to be projected therefrom, said case having a selecting-plate upon the opposite face with openings therein for the passage of type-actuating means, movable type yieldingly held in a normal position within said case, means for movably supporting said type-case to permit a universal movement thereof in a plane parallel to that of a printing surface, a type-lever for actuating each type to make an impression, a platen, means for moving a paper sheet in contact therewith, a spacing lever yieldingly interposed between said type-lever and said paper-moving means, one end of said lever being movable over the surface of said selecting-plate and space determining means upon said selecting-plate bearing a predetermined relation to each type, for arresting the movement of said spacing-lever before the completion of a full stroke of the type-lever.

4. A printing machine of the character described, comprising, in combination, a type-case having an open face from which type may be moved, movable type yieldingly held therein, means for movably supporting said case to permit a universal movement thereof in a plane parallel to that of a printing surface, whereby the various type may be brought to a printing position, said type being normally banked against a selecting-plate forming a part of the case, said plate having openings therein in registration with the respective type, means thereon for indicating the respective characters represented by said openings, a platen, and means for actuating said type in predetermined order through said openings.

5. A printing machine, comprising, in combination, a type-case having side walls and an opening from which the type may be projected, movable type yieldingly held therein, means for movably supporting said case to permit a universal movement thereof in a plane parallel to that of a printing surface, said case having a selecting plate against which the type may be normally banked, said plate having openings therein in registration with the respective type, means thereon for designating the relative positions in the case of the respective type-characters, a stationary platen, a plunger located opposite said platen and means for forcing said plunger through said openings to cause an impression to be made by the type brought into registration therewith.

6. A printing machine of the character described, comprising in combination a type-case open at the bottom to permit the type to be moved downwardly to a platen, movable type yieldingly supported with their upper ends banked against a selecting-plate forming the top member of the case, means for movably supporting said case to provide for a universal movement thereof in a plane parallel to that of a printing surface, said selecting plate having openings therein in registration respectively with the several type, a platen, a type actuating plunger formed to enter said openings, characters upon said plate for designating the relative locations of the type, means for actuating said plunger, and spacing means operated by said actuating means.

7. A printing machine of the character described, comprising, in combination, a type-case open at the bottom to permit the type to be moved downwardly to a platen, movable type yieldingly supported within said case with their upper ends banked against a selecting-plate forming the upper surface of said case, said plate being provided with designated openings in registration with the respective type, a type-case carriage, arranged to be moved back and forth in a given direction, a primary carriage mounted upon the machine frame for supporting said type-case carriage, said carriages being arranged to move in relatively divergent paths, a platen, means for actuating said type through said openings when brought to a printing position, and means for feeding the paper with each type impression.

8. A printing machine of the character described, comprising, in combination, a type-case supported upon a carriage mounted in turn upon another carriage, the two having relatively divergent ways, movable type within said case, means for independently and yieldingly maintaining the same in a normal position, a platen, means for actuating each type to make an impression when brought to a printing position, friction rollers for moving the paper after each impression, means for operatively connecting said rollers with said type actuating means, and means for moving said paper at right angles to the direction in which it is moved by said rollers for the purpose of line spacing.

9. A printing machine of the character described, comprising, in combination, a type-case supported upon a carriage mounted in turn upon another carriage, the two having divergently arranged ways, movable type within said case, means for independently and yieldingly maintaining the same in a normal position, a platen, means for moving each type to make an impression when brought to a printing position, friction rollers for moving the paper in the direction of the line to be printed, means for actuating said friction rollers, means for operatively

connecting said rollers with said actuating means and means for maintaining said rollers in frictional contact with the paper while the type-case carriage is in a printing position.

10. A printing machine, comprising, in combination, a type-case having movable type held normally in a given plane, said case having a selecting-plate provided with openings therein in registration with the respective type, means for movably supporting a paper sheet in a plane parallel thereto, means for movably supporting said type case in parallel relation to said paper to permit any selected type to be brought to a printing position, means for actuating said type through the openings in said selecting-plate, paper feeding means to cause character spacing, means moved by said type actuating means for actuating said paper feeding means and limiting means upon said selecting plate for varying said feeding means in conformity to the relative width of the different type.

11. A printing machine, comprising, in combination, a type-case having movable type, the faces of which are held normally in a given plane, said case being provided with a selecting-plate having openings therein in registration with the respective type, means for movably supporting a paper sheet in a plane parallel thereto, means for movably supporting said type-case in parallel relation to said paper to permit any type therein to be brought to a printing position, means for actuating said type through the openings in said selecting-plate, paper feeding means, a vibrating lever for actuating said paper feeding means, yielding means in operative connection with said type-operating means for actuating said vibrating lever, and stops upon said selecting plate for engaging said vibrating lever to vary its throw in proportion to the width of the type represented by the respective stops.

12. A printing machine having a type-case open at the bottom, means for movably supporting said type-case in a horizontal plane, a spring within each type body for normally holding the type against a banking at the top of the case, transverse supporting members extending through vertical slots in said type to serve as rests for said springs, and means for depressing any predetermined type independently of its fellows.

In testimony whereof, I have signed this specification in the presence of two subscribing witnesses, this 16th day of February, 1915.

HJALMAR ELMBLAD.

Witnesses:
DAVID H. FLETCHER,
JOHN F. HORN.