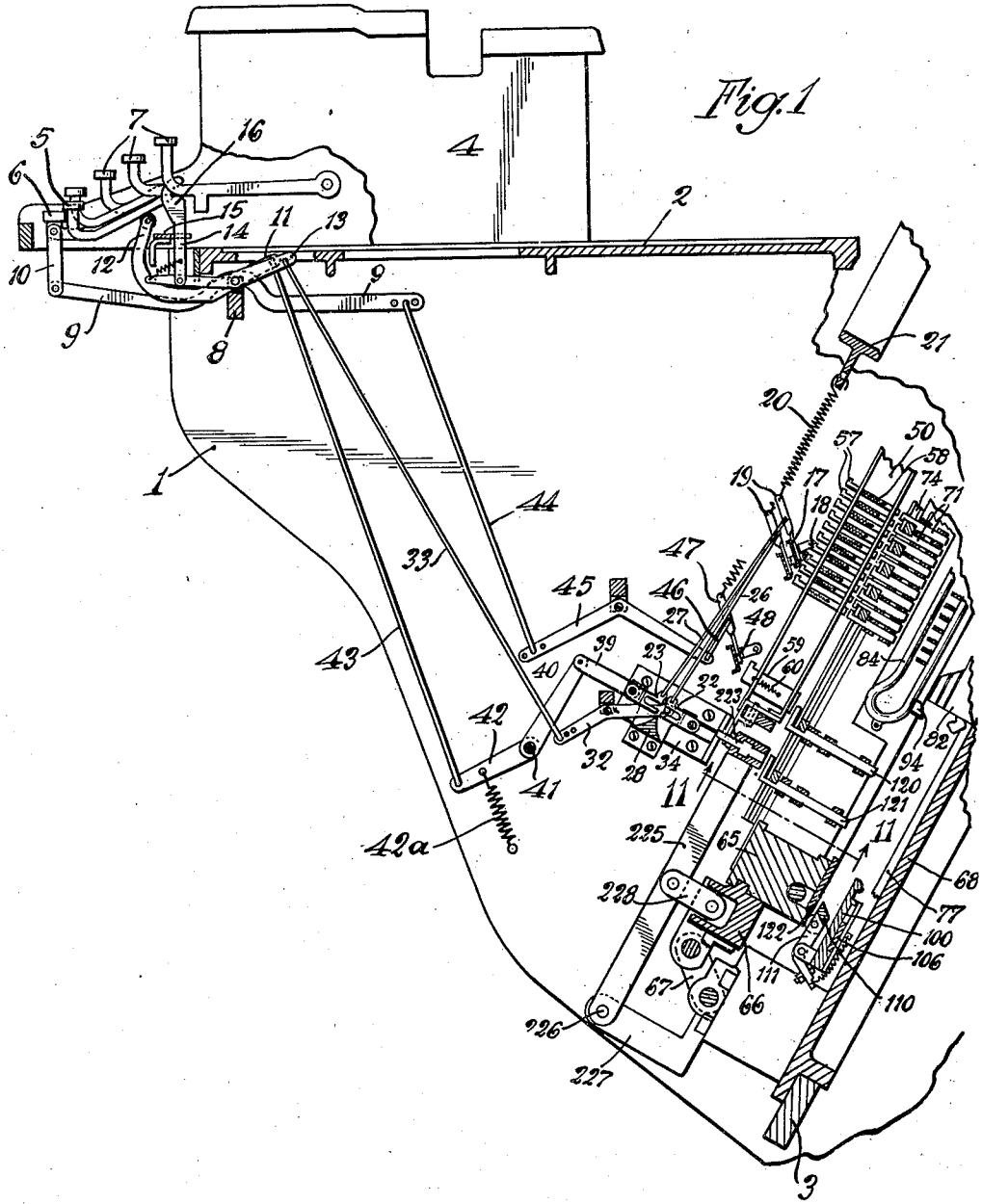
June 3, 1941. C. A. MACOMIC 2,243,875

COMPOSING MACHINE

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Fig. 1



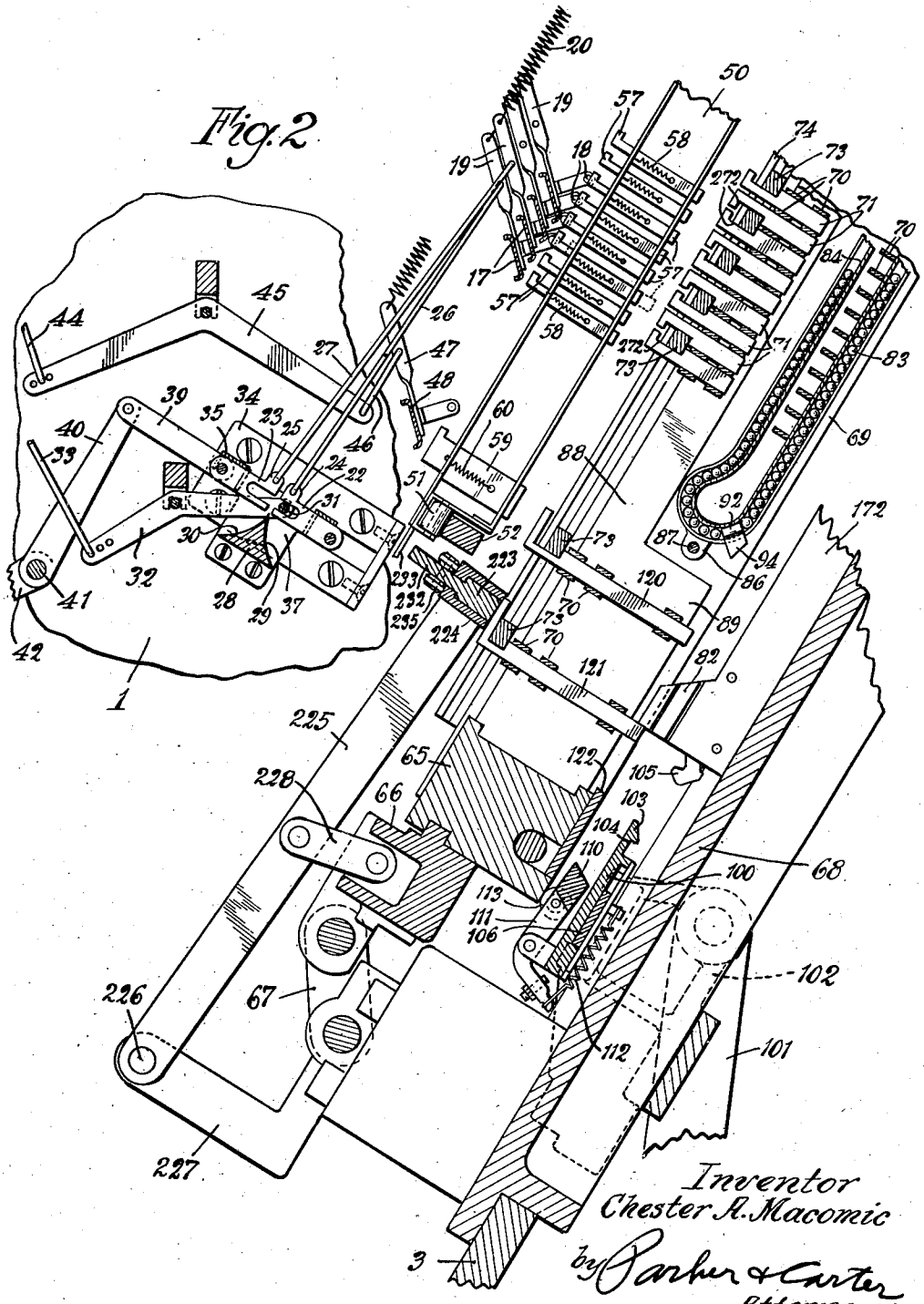
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COMPOSING MACHINE

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Fig. 2



June 3, 1941. C. A. MACOMIC 2,243,875

COMPOSING MACHINE

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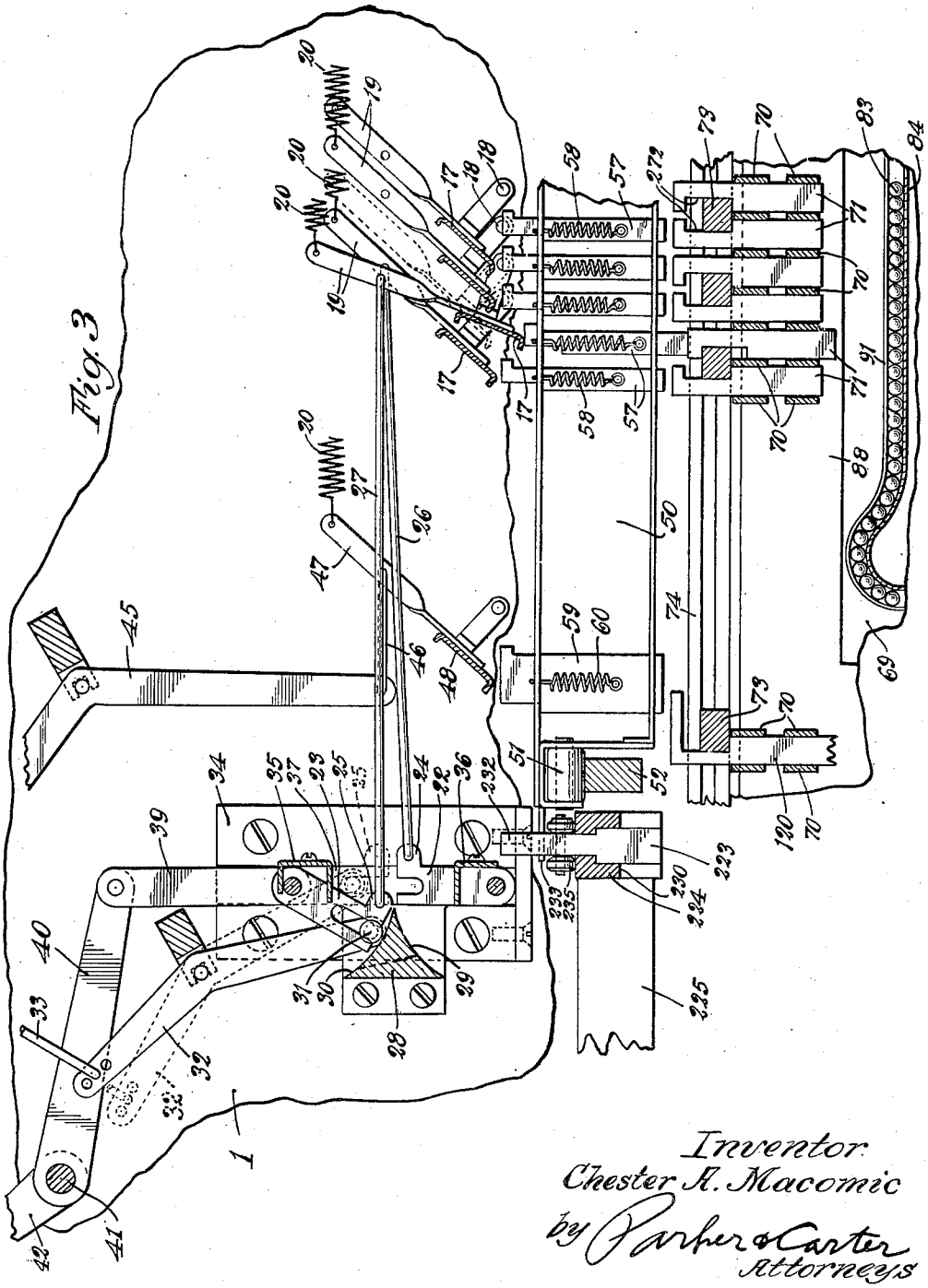


Fig. 3

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COMPOSING MACHINE

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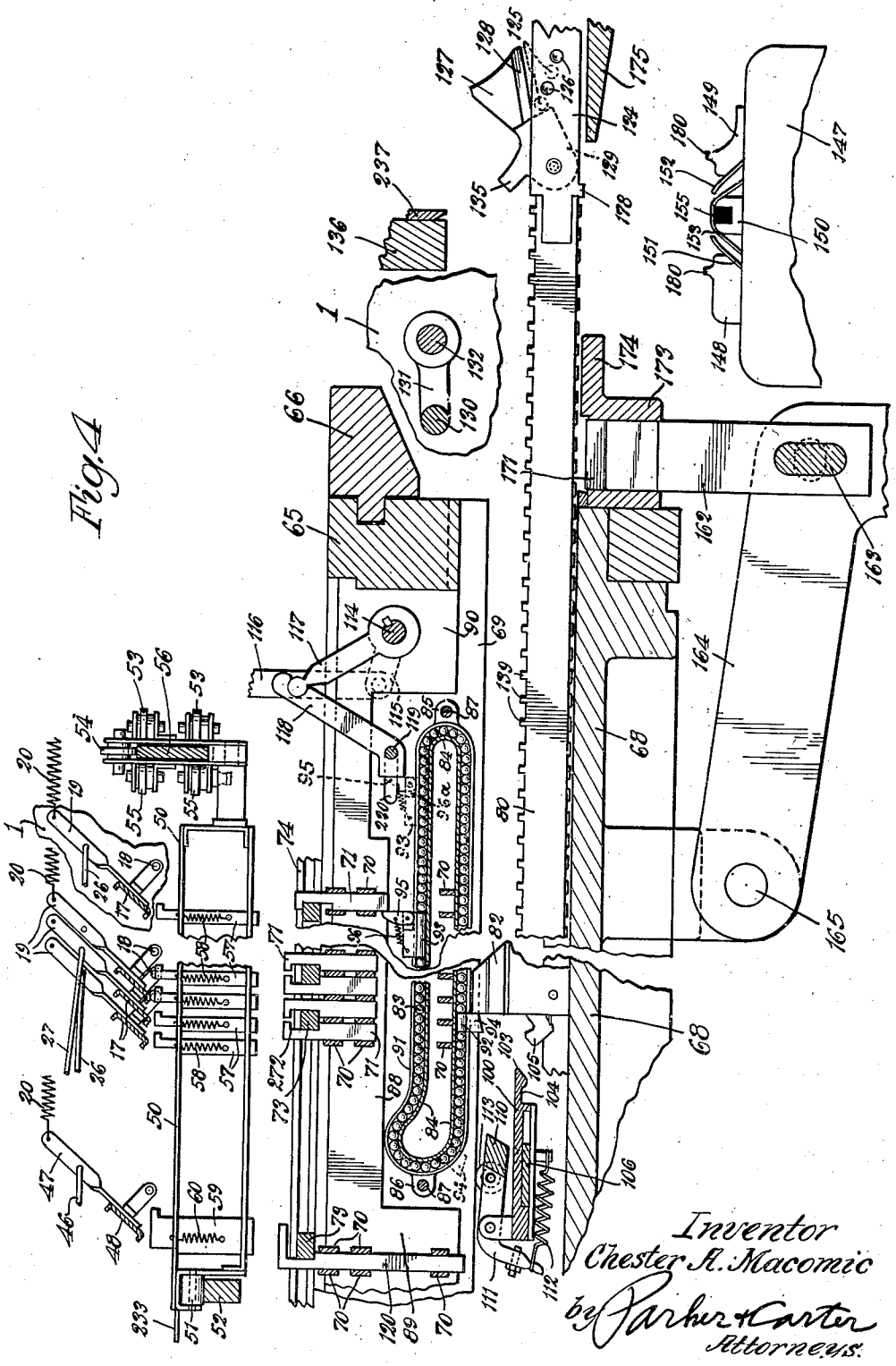


Fig. 4

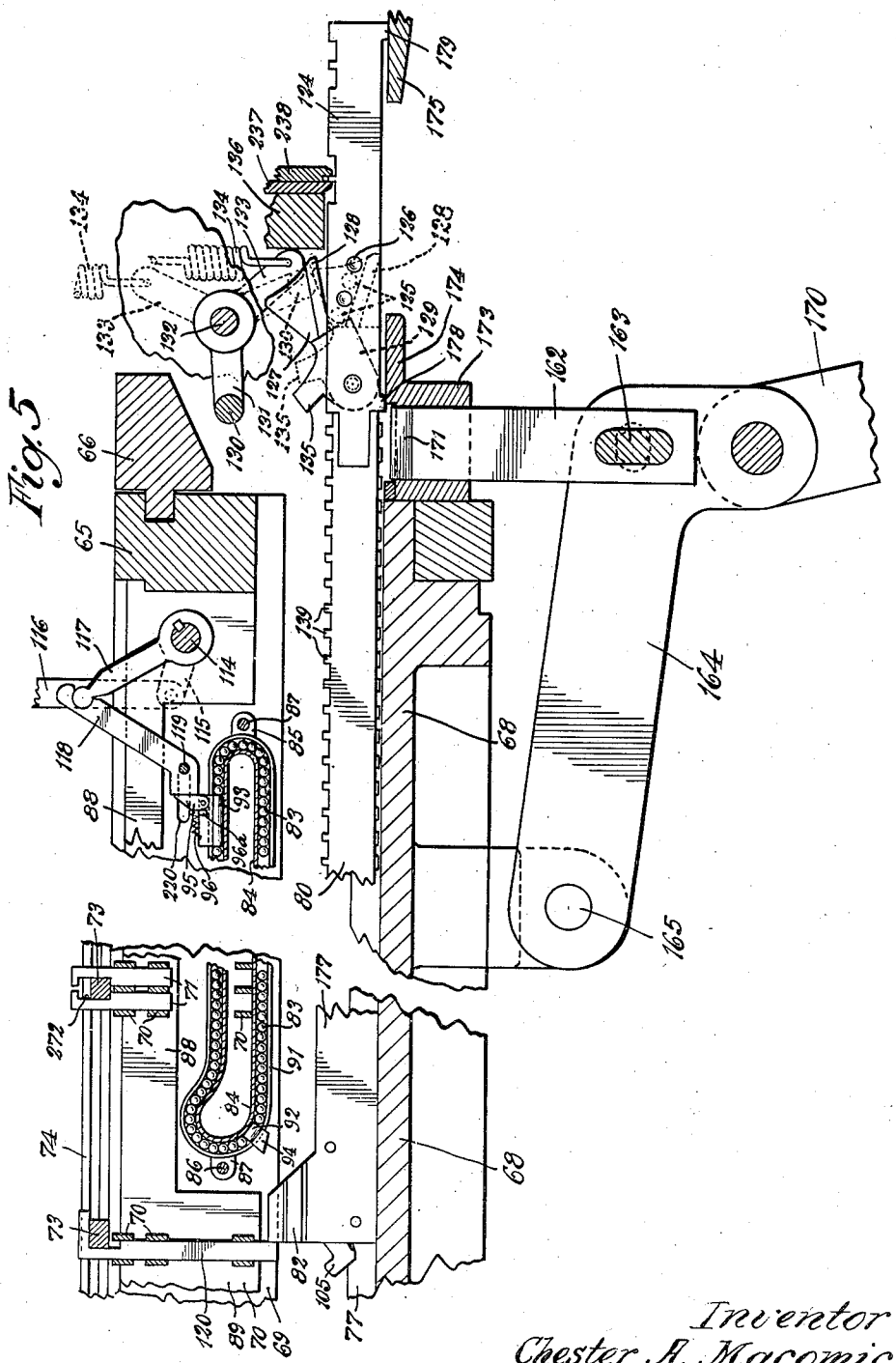
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COMPOSING MACHINE

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Fig. 5



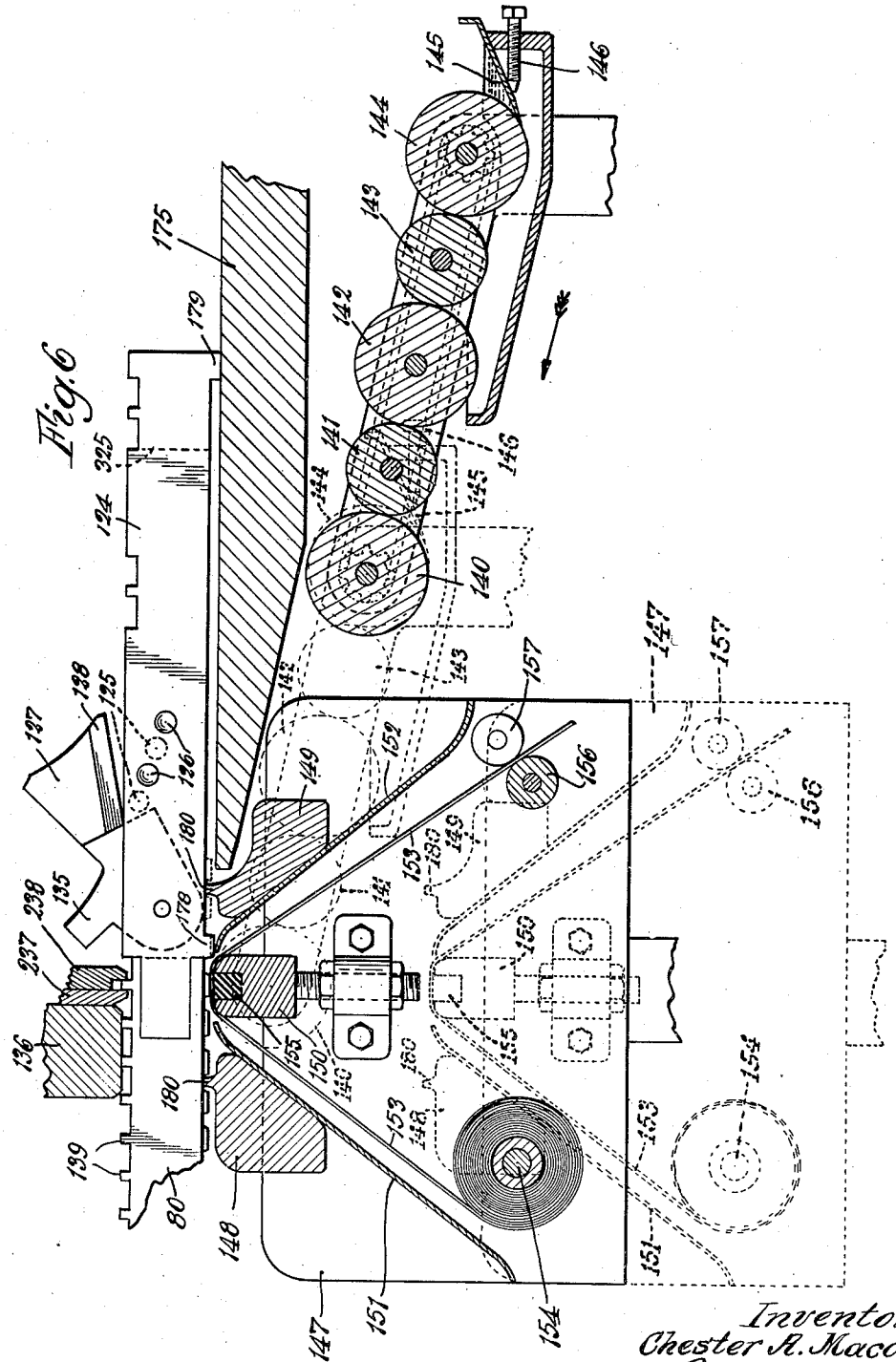
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COMPOSING MACHINE

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Fig. 6



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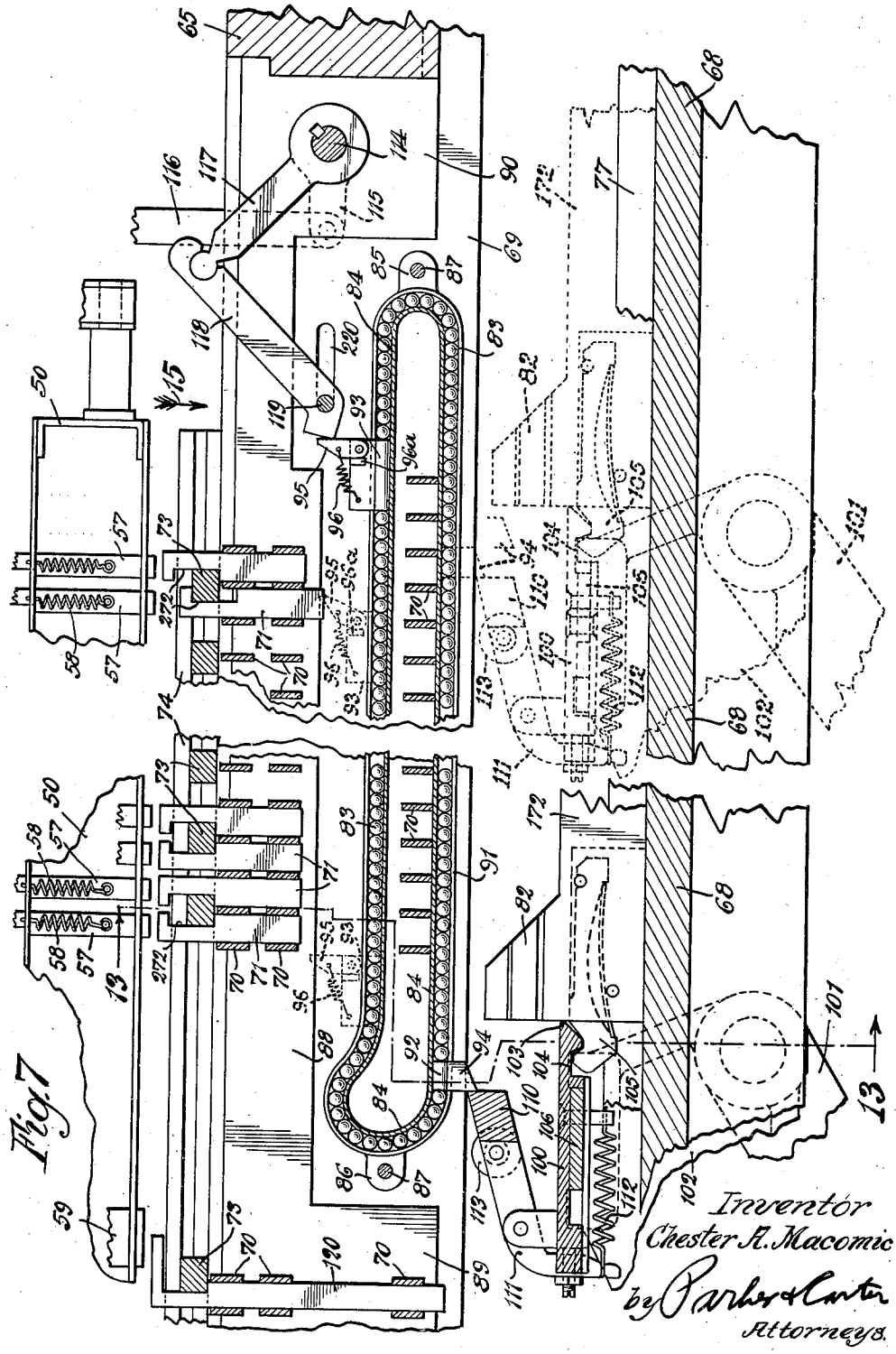


Fig. 7

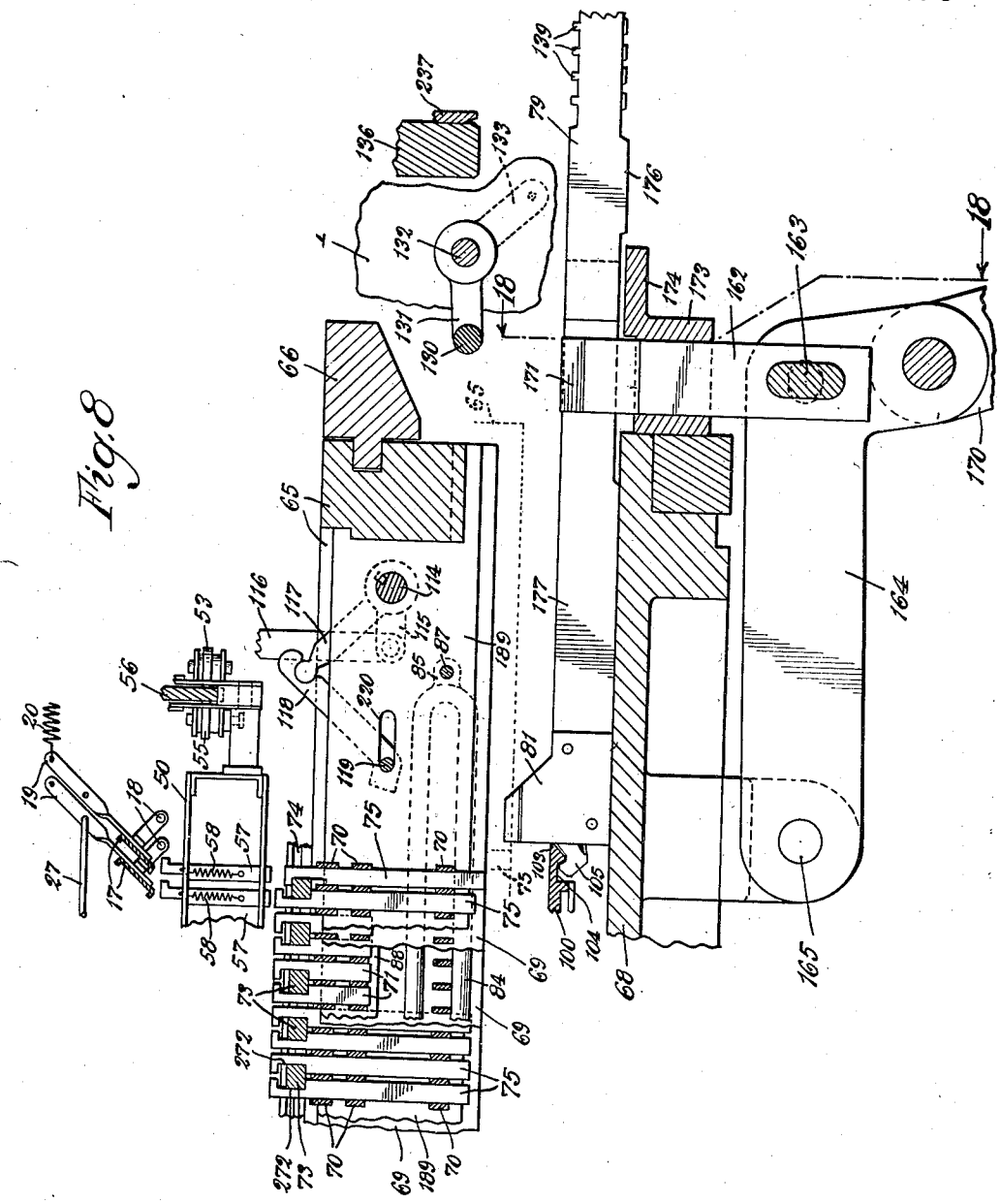
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COMPOSING MACHINE

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Fig. 8



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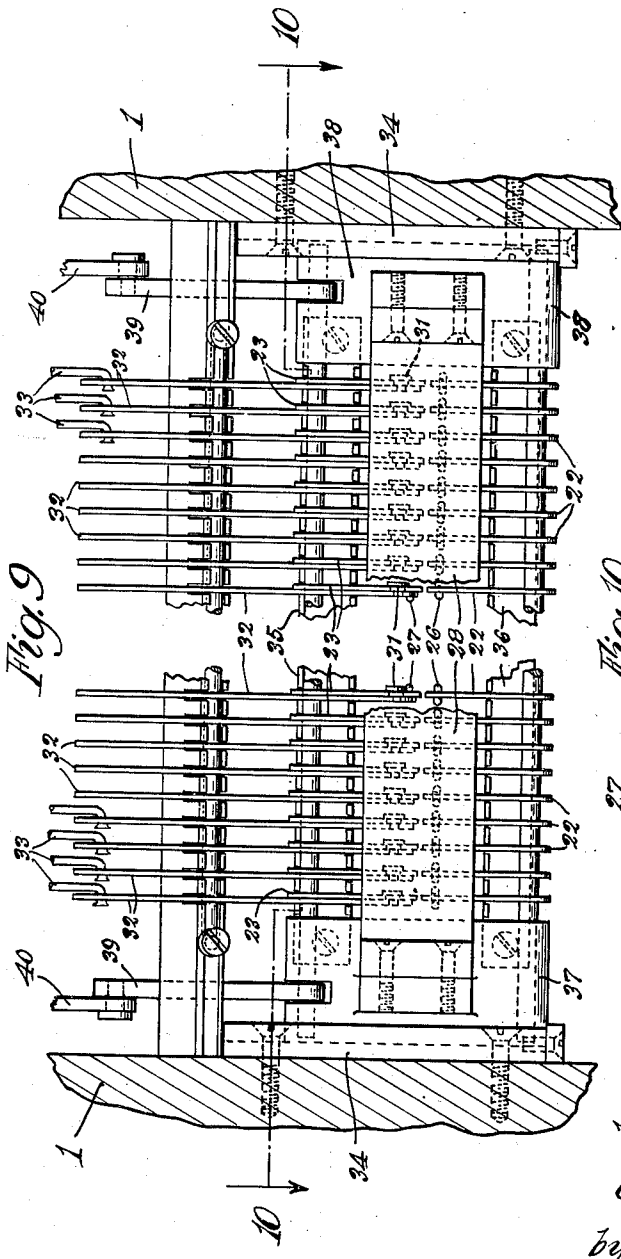


Fig. 9

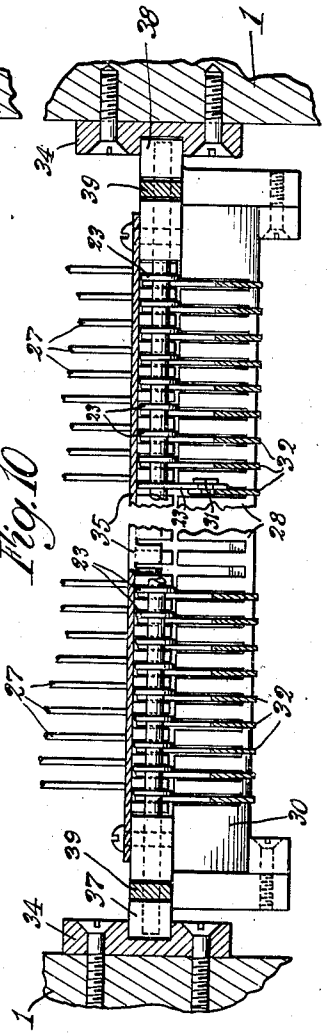


Fig. 10

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COMPOSING MACHINE

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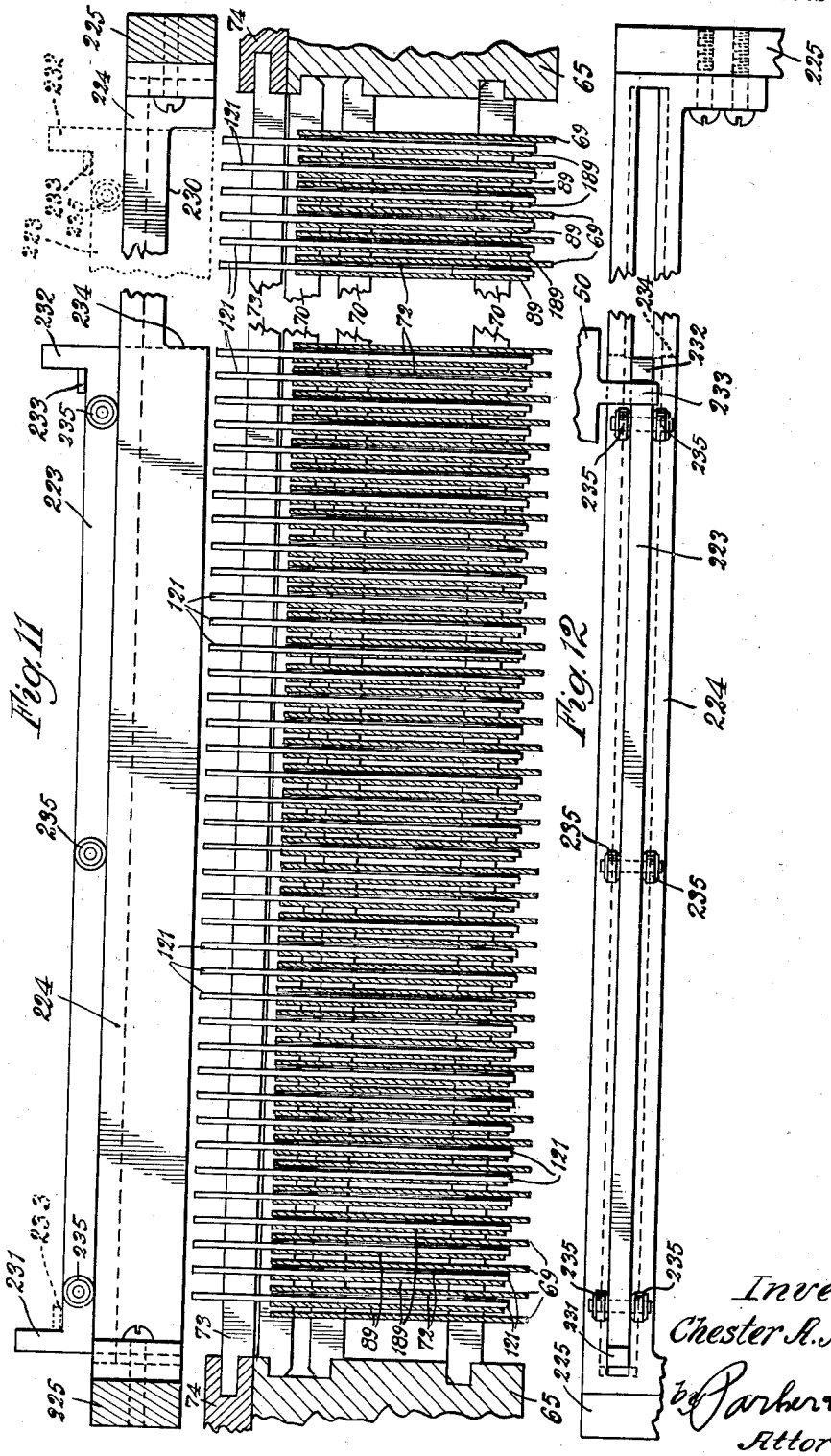


Fig. 11

Fig. 12

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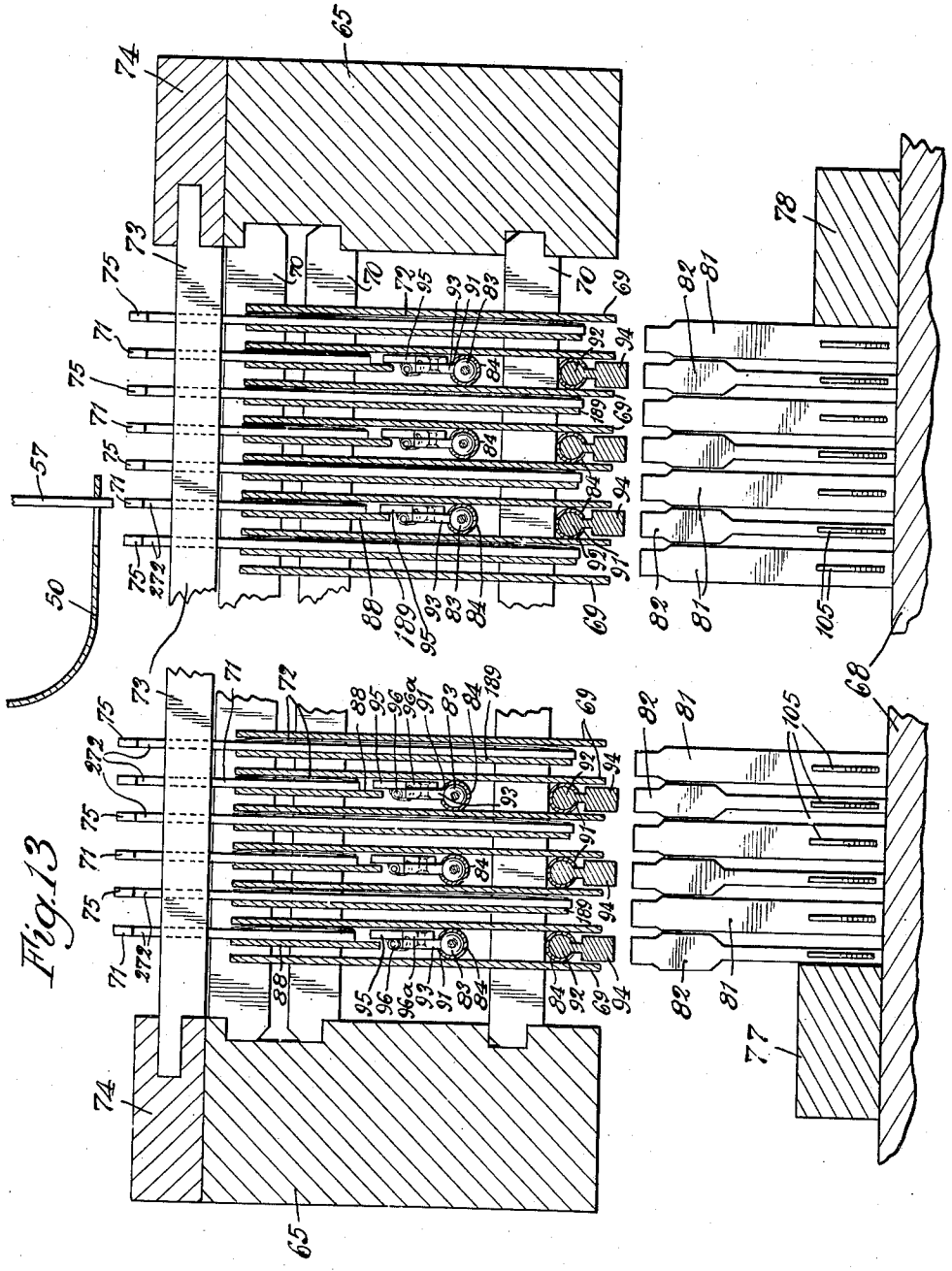


Fig. 13

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Fig. 14

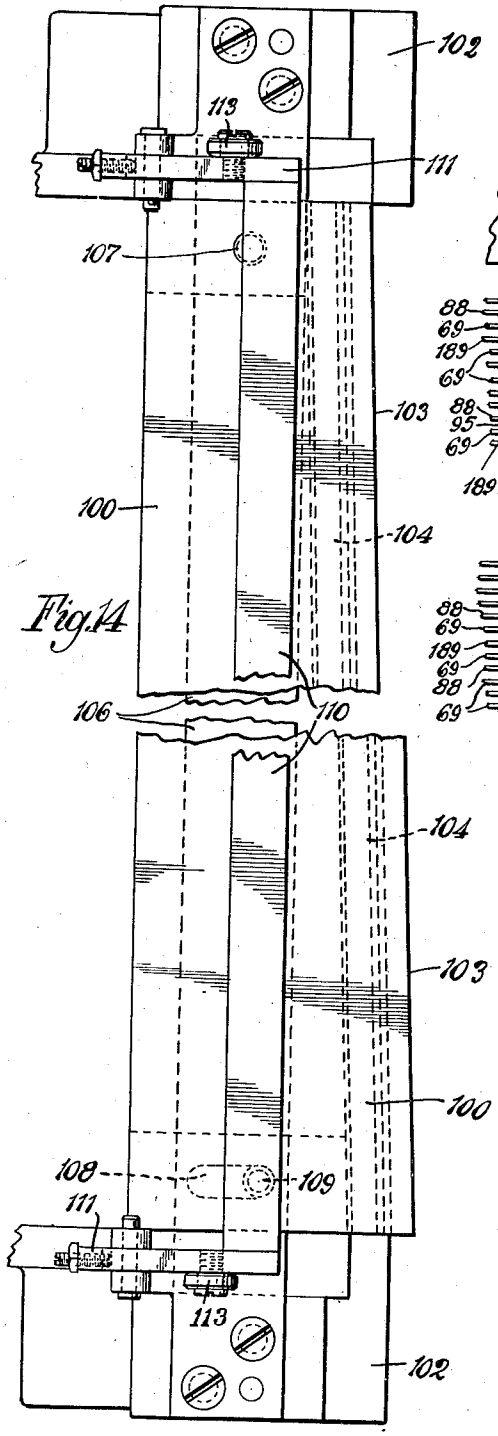
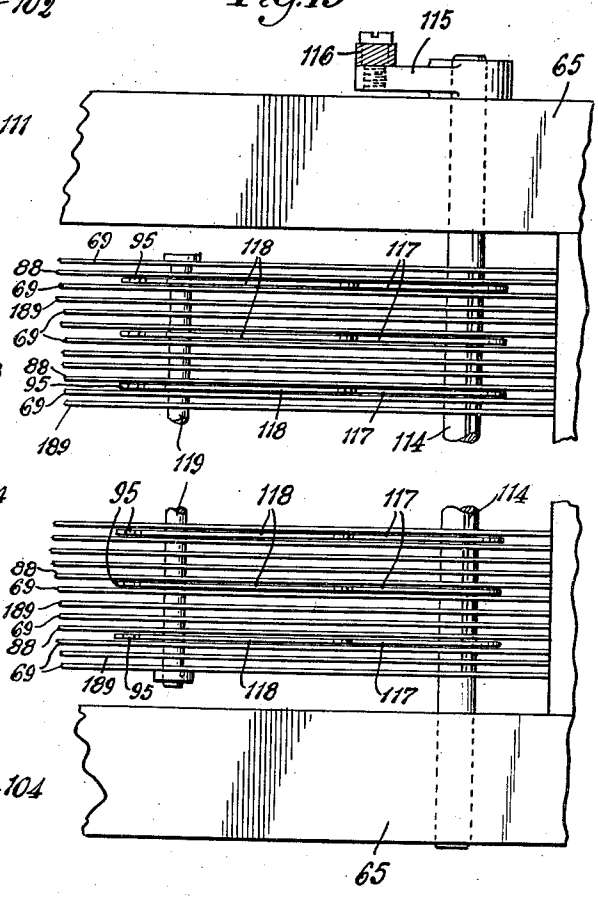


Fig. 15



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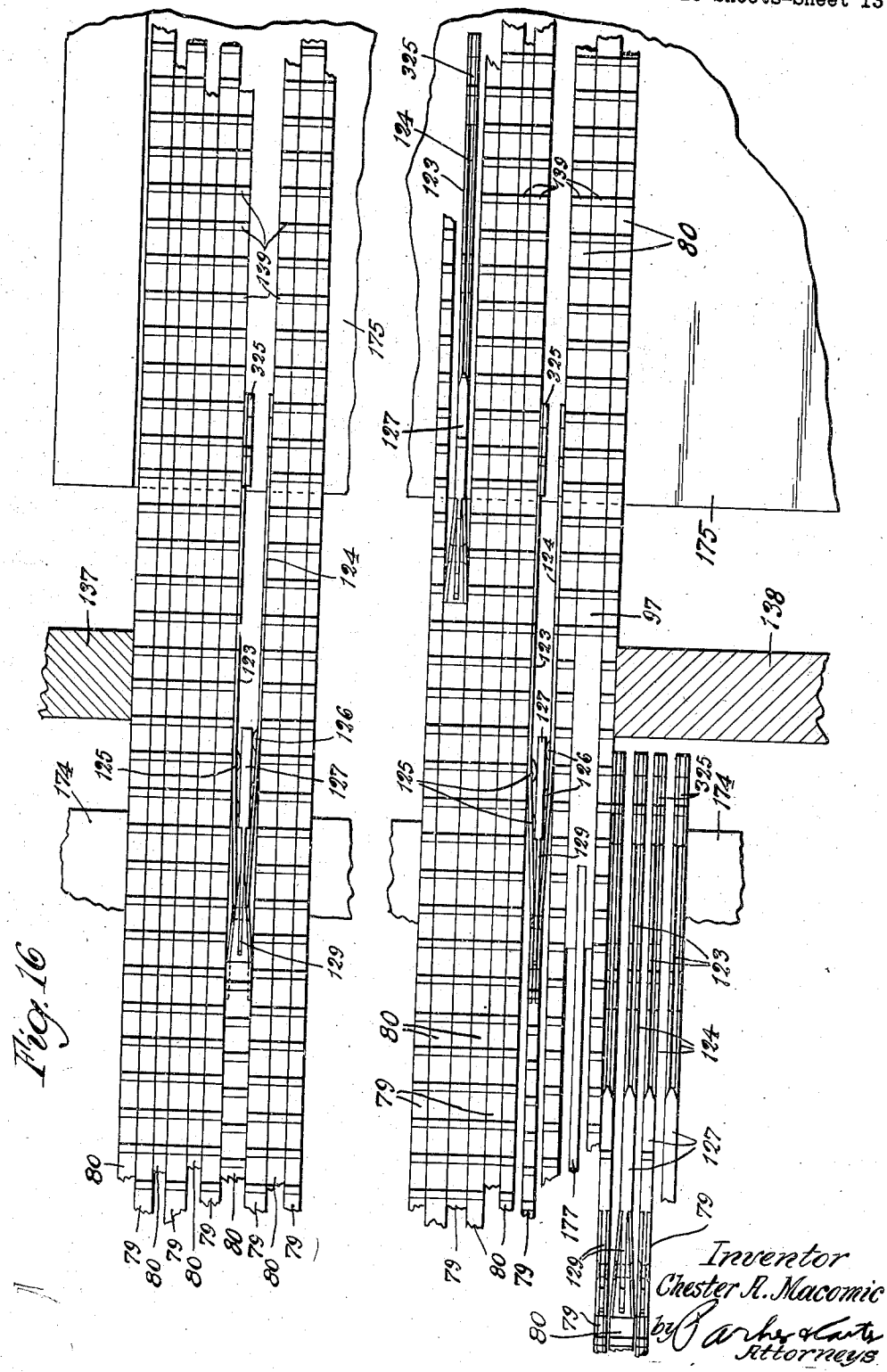


Fig. 16

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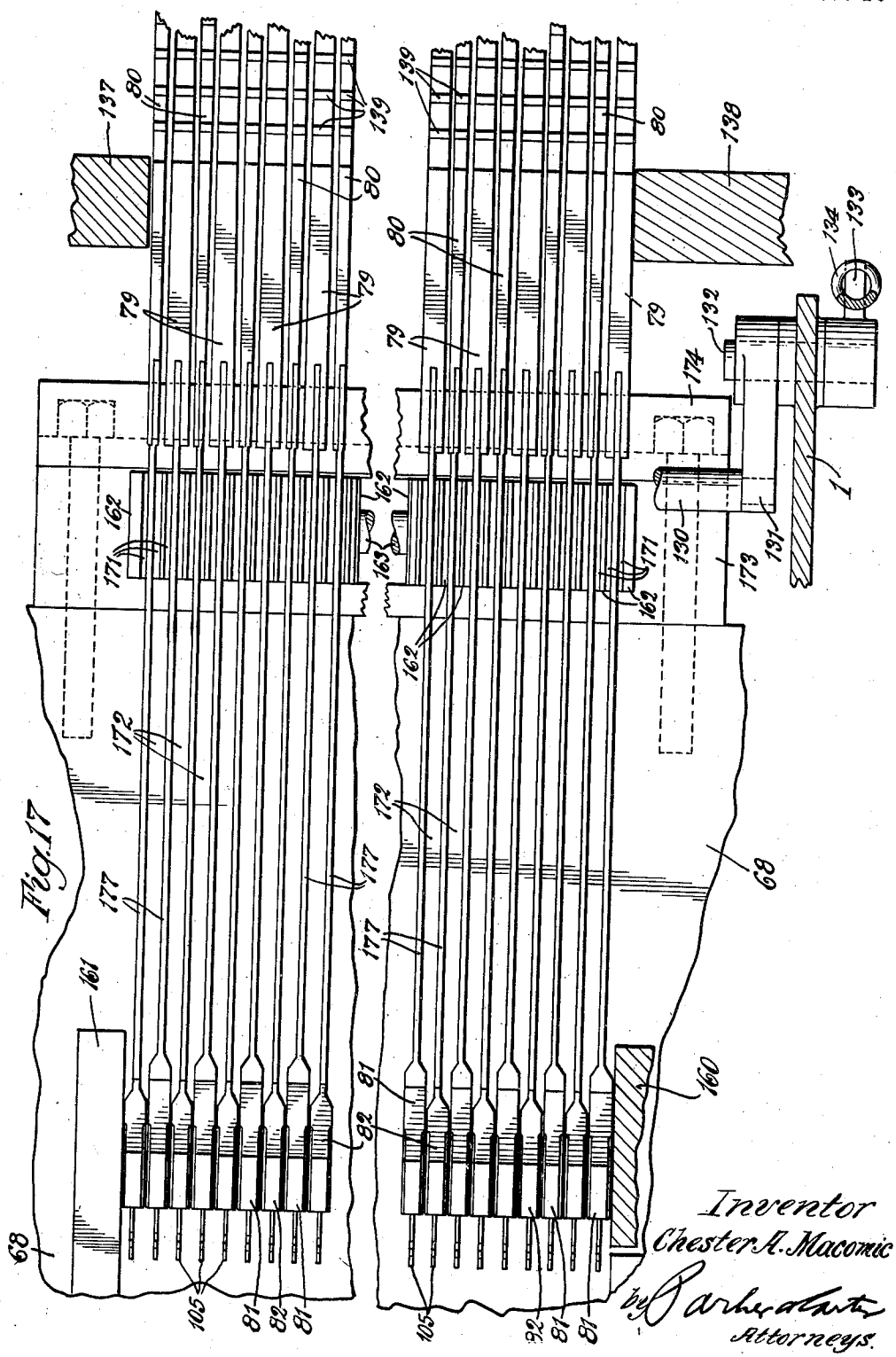


Fig. 17

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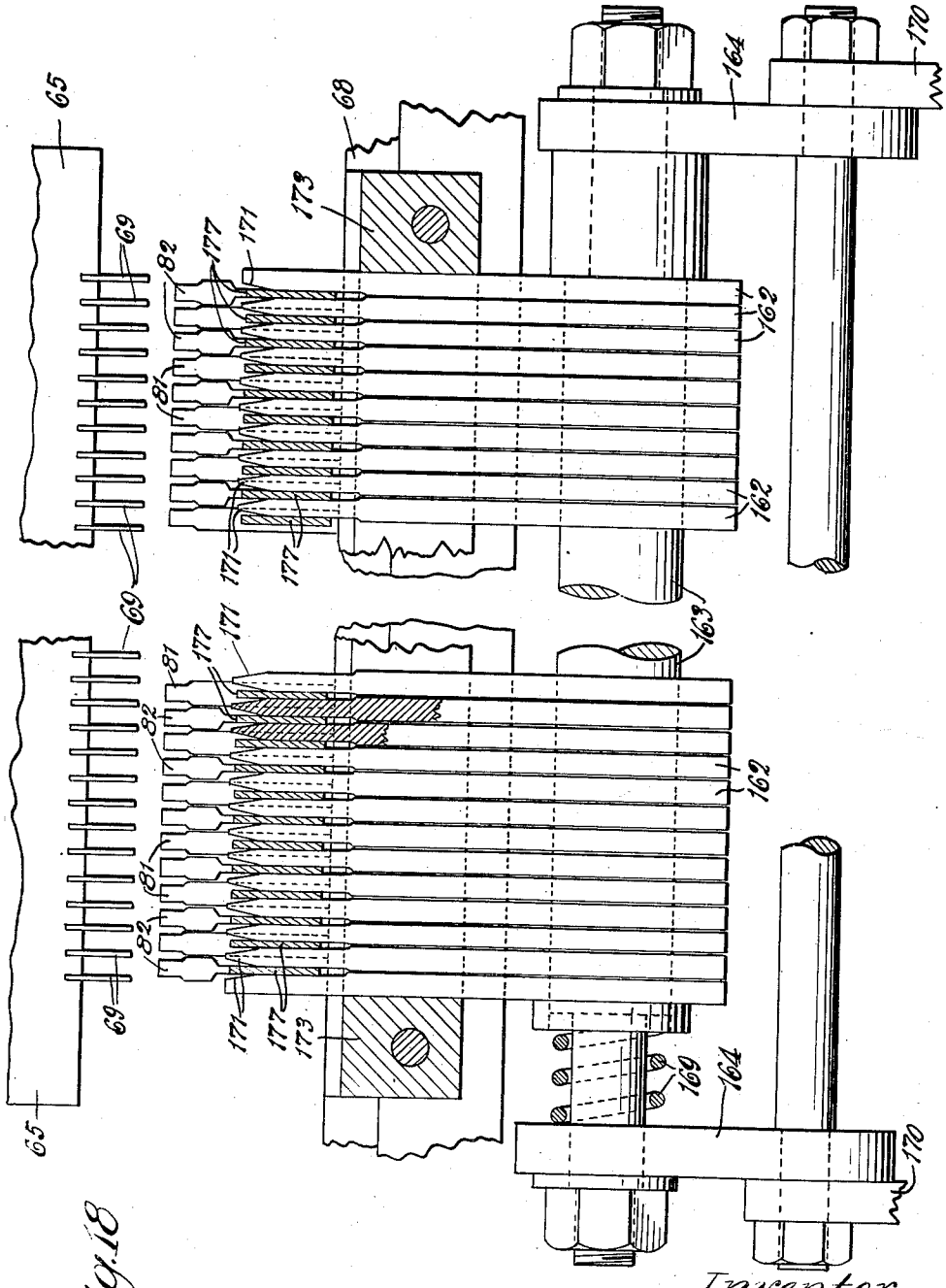


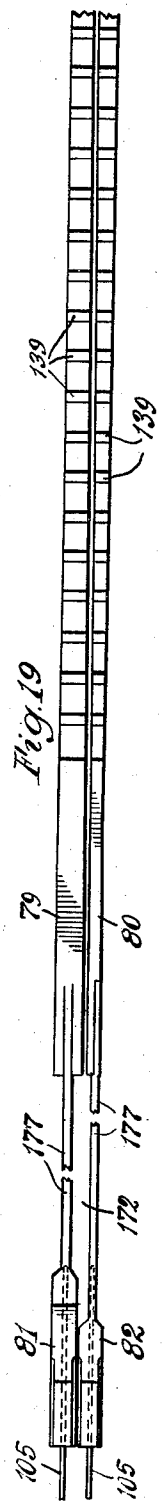
Fig. 18

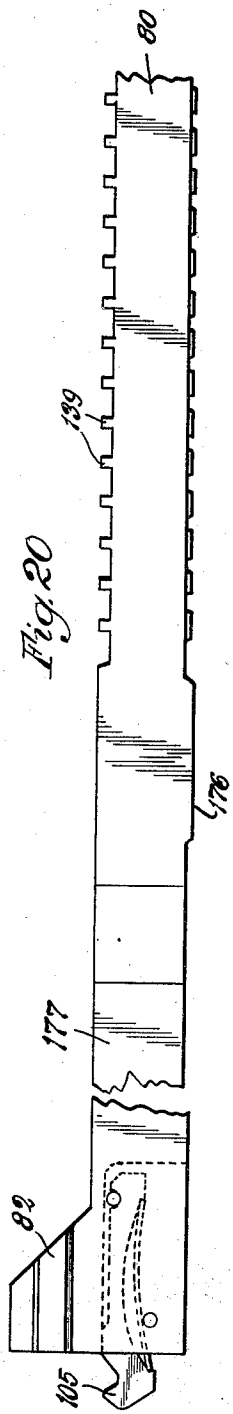
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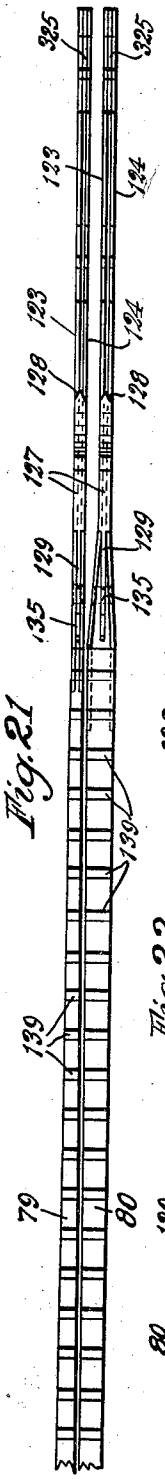
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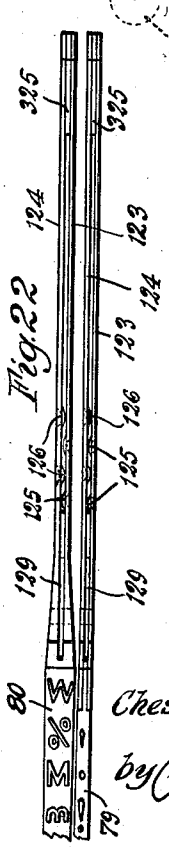
COMPOSING MACHINE

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Patented June 3, 1941

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UNITED STATES PATENT OFFICE

2,243,875

COMPOSING MACHINE

Chester A. Macomic, Chicago, Ill.

Application December 16, 1939, Serial No. 309,629

20 Claims. (Cl. 276—8)

My invention relates to improvements in composing machines and the like, and has for one object to provide a new and improved type of composing machine whereby printing characters may be set, selected and assembled in successive justified lines by the use of the ordinary typewriter and whereby a series of characters may be easily and acurately assembled in a line and reproduced in such form as to be especially well adapted for use in connection with the well-known lith off-set process of printing.

In general my invention contemplates the use of a plurality of type bars or strips which are mounted in a suitable bed frame for longitudinal reciprocation. Means are provided whereby the type bars may be selected or arrested in their longitudinal movement at such points for each bar that the characters on the bars will form a line of type characters, one on each type bar, so as to produce a line from which a printed impression may be made. My invention includes a suitable mechanism which may be presented to and receive an impression from such line of assembled type and a series of mechanisms controlled by an ordinary commercial typewriter whereby the operator may write a line, which by operation of my device will thereupon be reproduced by a proper assembly and positioning of the type bars. There are also means associated with each type bar whereby the line may be automatically justified to compensate for variation in the widths in the characters in the line while still maintaining lines of equal length.

My invention is illustrated more or less diagrammatically in the accompanying drawings, wherein—

Figure 1 is a longitudinal section through a part of my composition machine, showing the typewriter and other elements part in section and part in elevation, showing the pattern bed in the upper position.

Figure 2 is a section on a larger scale taken on a plane similar to Figure 1, showing the pattern bed in lowered position.

Figure 3 is a similar section on enlarged scale illustrating the shift mechanism.

Figure 4 is a section on a large scale illustrating the stop mechanism applicable for both long and short travel of alternate type bars.

Figure 5 is a section similar to Figure 4 illustrating especially the justifying mechanism.

Figure 6 is a section through the printing mechanism showing the parts in printing position.

Figure 7 is a longitudinal section illustrating part of the restoring mechanism.

Figure 8 is a longitudinal section showing the driving head end of the type bar with the parts in the restored position.

Figure 9 is a plan view of part of the shift mechanism.

Figure 10 is a section along the line 10—10 of Figure 9.

Figure 11 is a section on an enlarged scale along the line 11—11 of Figure 1.

Figure 12 is a plan view of the parts shown in Figure 11.

Figure 13 is a section on a large scale along the line 13—13 of Figure 7.

Figure 14 is a plan view of the pull bar which propels the type bars.

Figure 15 is a plan view of the initial restoring mechanism, the view taken in the direction of the arrow 15 on Figure 7.

Figure 16 is a plan view with parts omitted of the type bars in justified and assembled position.

Figure 17 is a plan view of the drive head end of the type bars in restored initial position as shown in Figure 8.

Figure 18 is a transverse section along the line 18—18 of Figure 8.

Figure 19 is a plan view of head or drive ends of two adjacent tapered type bars.

Figure 20 is a side elevation of Figure 19.

Figure 21 is a plan view of the tail or justifying ends of the type bars shown in Figure 19.

Figure 22 is a bottom plan view of Figure 21.

Figure 23 is a side elevation of Figure 21.

Like parts are indicated by like characters in the various figures.

The general type of mechanism, that is to say the drive mechanism, supports for the squeeze mechanism and other elements which in the interests of simplicity have not been illustrated, are disclosed among other patents in my Patents 1,916,272, 2,076,583, 2,109,494, 1,775,822, and 1,753,439. It is believed that in the light of the disclosures of these patents further illustration of those features disclosed in them which form no part of the present invention would only complicate and confuse the disclosure. Details of the frame and supporting mechanism, except where they form an essential part of the elements shown in any of the figures, are omitted.

1 is a side frame, there may be one or two or more. They are joined together by frame members 2—3, supported on the cross member 2 is a typewriter 4. It has a shift key 5, a space bar 6, and a series of character keys 7, all of

them mounted on suitable levers common to the ordinary type of commercial typewriter.

Mounted on the cross member 8, beneath the frame member 2, and the typewriter 4, are a plurality of levers. The lever 9 is connected by means of a link 10, to the space bar. The lever 11 has an extension 12, associated with the lever which supports the shift key 5. The levers 13 carry pivoted thereon extensions 14, guided in the typewriter comb plate 15, and having heads 16, each associated with one of the typewriter character keys, one key controlling each lever.

Mounted between the frame members 1 are a plurality of channel shaped plates or shutter bars 17. They are pivoted as indicated at 18, and placed side by side along an inclined plane beneath the frame 2. Each of these shutter bars has a tail piece 19, each tail piece has associated with it a spring 20, the springs being anchored on a frame 21; all of the springs tending to rotate the members 17 in a clockwise direction to the raised or starting position.

Each typewriter key controls two typewriter characters, the shift mechanism of the typewriter is used, therefore, first to select that one of the two typewriter characters which is to be selected by each key in the usual manner, and secondly, to position a pin in the pattern bed and associated at such a place that it will control the positioning of a type bar as will hereinafter appear. This is accomplished by the typewriter in the following manner: 22 is a slotted lever opposed to a slotted lever 23 and working in opposition thereto, they are both controlled by the typewriter shift key 5, as will hereinafter appear. These levers terminate adjacent to one another and the slots in the two levers are in alignment. Each lever has an ear 24—25, links 26—27 being connected respectively to those ears, each link in turn being connected to one of the tail pieces 19. The links may, as shown in Figure 3, be connected to adjacent tail pieces or they may be connected to widely spaced ones depending upon the position of the desired character on the type bar because in view of the different widths of the different letters, the letters on the type bar do not bear the same relationship to their neighbors as the characters on the typewriter key. There is one pair of these levers 22—23 for each typewriter key.

28 is a comb plate, the upper and lower faces of which are curved (concave or cylindrical in shape) as indicated at 29 and 30 respectively, concentric with the centers of rotation of the links 22 and 23. 31 is a pin carried on the lever 32, which lever is adapted to be actuated by the link 33 from the character key lever 13, there being, therefore, a separate connection between each typewriter key and its associated lever 32, and there being one lever 32 for each pair of slotted levers 22 and 23.

34 are guide plates secured to either side of the frame 1, in which shoes 37—38 (Figures 3, 9 and 10) are free to slide, these shoes being joined by cross members or combs 35—36. The comb plate 28 is fixed in position adjacent the path of the shoes.

39 are links pivoted on the shoes 37—38, and supported by levers 40 on a cross shaft 41, upon which is a lever 42, actuated by a link 43 from the shift key actuated lever 11. A spring 42a normally holds the parts in the position as indicated in Figures 1 and 2.

The operation of this device is that the pin 31, controlled by one of the typewriter keys may actuate either the lever 22 or the lever 23. If the typewriter shift key is in the normal or lower case position the pin 31 will remain in engagement with link 22, and whenever either lever of a pair is moved into the angular position the pin associated with the pair of levers will be held in the slot by the curved surface 29—30 of the comb plate, so that it is never possible for an improper manipulation of the typewriter shift key to break the connection between the typewriter key and one or other of the shutter plates or bars 17. The single typewriter key may control the selection of adjacent characters on the type bar or if the characters are widely spaced upon the bar as necessitated by the different widths of the different characters, then a single typewriter key may select widely spaced characters on the bar.

A link 44 extends from the space bar actuated lever 9, to a bell crank lever 45, which in turn is connected by a link 46 to the lever 47 associated with a shutter bar 48, responding to the manipulation of the space bar 6, as will hereinafter appear.

50 (Figures 3 and 4) is a plunger carriage which rides on a roller 51, on a track 52, at its lower end and on rollers 53, 54, 55, on the track 56 at its upper end. This plunger carriage contains a row of plungers 57, each of them normally retracted into the upper position by springs 58, and at the lower end a space bar plunger 59, retracted by a spring 60. The plungers 57 are each of them controlled by one of the shutter plates 17. The plunger 59 is controlled by the shutter bar 48. The purpose of this last element will hereinafter appear in connection with justification.

The typewriter carriage, as it reciprocates in the usual manner, controls by mechanisms not here illustrated as they form no part of my present invention, the position of the plunger carriage, the plunger carriage moving back and forth across the type bars in unison with the typewriter carriage. The plunger carriage, therefore, moves back and forth beneath the edges of the shutter bars 18, and no matter where the plunger carriage is it will respond to the movement of any one of the shutters tending to depress one of the plungers and in turn project one of the stop pins in the pattern bed. It will be understood that there are as many plungers 57 as there are characters in each type bar. The type bars are parallel with the plunger carriage and the pattern bed now to be described is interposed between the plunger carriage and the bank of type bars. The plunger carriage selects in the pattern bed the desired stop pins to arrest each one of the type bars in a position such that the desired type face will be presented to the printing mechanism.

The pattern bed comprises a generally rectangular frame 65, which is supported in a cradle, generally indicated by 66 (Figures 2 and 4). The lower end of the cradle is pivoted on one or more links 67, whereby the pattern bed may be lowered or raised by any suitable means not herein shown, since it forms no part of the present invention. Suitable supporting means are provided at the upper end of the cradle, to obtain parallel movement with the lower type bar bed 68. Positioned in the pattern bed 65 are longitudinal guide plates 69 (Figures 4 and 13), which in turn are tied and separated by additional cross members or combs 70. Positioned between the spaced guide plates 69 are

pattern pins 71, which are held in position by flat springs 72. The pattern pins are recessed as at 272, in order to receive the correction bars 73, mounted in a frame 74. The pattern pins 71 are in opposed pairs so that each restoring bar 73 actuates two banks of pattern pins 71. The pattern pins are normally in the upper position and held in whatever position they may be placed by the springs 72. After a line has been selected by the manipulation of the typewriter to depress a pattern pin into such position as will hereinafter appear, in the place necessary to present the desired printing character for printing, the pattern bed, which during the time selection is taking place is raised away from the type bar group, is lowered automatically to bring the pattern bed into register with the type bars so that the pin may operate to arrest or stop or select the proper character on its type bar.

As will hereinafter appear, the pattern pins are arranged in groups, parallel with the type bars, all the pins in one group are long ones extending down to the bottom of the pattern bed; all the pins in the next group are short ones, terminating at a point well above the bottom of the pattern bed. The pins 71, shown in Figure 4, are short pins; the pins 75, shown in Figure 8, are long pins. The pins 75 are recessed as at 272 just like the pins 71. The pins, both long and short, are held in whatever position they may be left by the mechanism by the springs above referred to, but the springs holding the pins by friction leave them free to move under the influence of the selecting or the resetting mechanism. All the pins are controlled by the correction bars 73, and the frame 74, and so far as the setting or selecting of the pins, and their correction or return to the starting position is concerned, they are identical, the only difference being in their length.

Travelling upon the type bar bed, 68, between guide blocks 77—78, are type bars 79—80. The letters, characters and assemblies on the type bars are arranged in order of width progressively from the widest character at one end down to the narrowest character at the other end. This results in a tapered type bar, because the width of the bar is only sufficient to provide space for the character. Each alternate bar is reversed with respect to its two neighbors (Figures 19–21), so that since half the bars are wide at the left-hand end of the bed and the other half are wide at the right-hand end, the assembly is generally rectangular.

The bar 79, for instance, has the wide letters adjacent the drive head, the bar 80 has the narrow letters adjacent the drive head and the letters in bar 79 decrease in width towards the opposite end, whereas the letters on the bar 80 increase in width towards the opposite end. All the bars have their drive heads in general alignment and all have their justifying mechanism, as hereinafter will appear, in general alignment at the other end.

This arrangement results in a series of tapered bars, alternate bars being tapered in opposite directions and is for the purpose of compensating for the different widths of the characters "M" or "W" being wide, "I" and "l" for instance, being narrow, there being many intermediate variations. If all the wide letters were at the same end of all the bars it would be impossible to hold the tapered bars together without an inordinately wide bed and distortion of the bars would result when justifying, and the line would tend to be curved, or at least not be in proper alignment. By reversing each alternate bar in this manner the wide portion of one bar being adjacent the narrow portion of the next one, the bed is maintained at proper width, and a smooth, each contact of all the bars is permitted.

Because of this reverse arrangement of the characters on the bars, it is necessary to arrest adjacent bars at different points to get the same letter and so the long pattern pins directly contact the drive heads 81, associated with the bars 79, and the other means must be provided to arrest and engage the drive heads 82, associated with the bars 80.

This means includes an endless ball chain 83, in a closed ball race 84, held by the ears 85—86, and rods 87, in the spaces between each alternate pair of guide plates 69. The short pattern pins 71 are associated with the bars 80 and control them through the ball chains, being associated with narrow guide plates 88, which terminate above the ball races 84. In the alternate spaces between the ball races the long stop pins 75 are associated with intermediate guide plates 189. The pattern bed thus comprising a series of alternate long and short pattern pins associated with a series of narrow and intermediate guide plates and associated also with a series of wide guide plates (Figure 13).

At their ends the narrow guide plates 88, as indicated at 89 and 90, extend downwardly beyond opposite ends of the ball race to guide other pattern pins as will hereinafter appear, and also to give support and rigidity to the structure. The race 84, in which the ball chain 83 travels, is exteriorly slotted at 81 in Figure 13, and there are interposed in the ball chain two diametrically spaced carriages 92—93 (Figure 7). Each carriage 92, has a stop member 94, which extends downwardly toward the lower portion of the pattern bed into substantially the same position as the ends of the long pattern pins. Each carriage 93, has a pivoted link 95, free to rotate in a clockwise direction against the tension of the spring 96, but limited in its movement in a counter-clockwise direction by an abutment 96a.

When the pattern bed is lowered to bring it into a position such that it may cooperate with the bank of type bars, each of the members 94 is in line with its associated drive head, but the member 94, unlike the long pattern pins does not of itself arrest the motion of the type bar because of the negligible friction in the ball chain, so that as the type bar comes forward to engage the member stop 94, it pushes the member along with it. The stop effect is obtained by the short pattern pins and is effective only when the trigger member 95 has been pushed around by the movement of the drive head to bring the member 95 into engagement with one of the short pattern pins.

By this arrangement one-half of the type bars are arrested by direct contact with the long pattern pins, and the other half are arrested indirectly by the short pattern pins through the intermediary of the ball chain and the two diametrically opposed stop members carried by the chain. Because of the fact that the drive head pressure is applied on one side of the closed chain loop, and the stop pins are on the other side, the direction of pressure applied to the short pins is opposite to the direction of pres-

sure applied to the long pins, thus equalizing the load on the pattern bed.

The equalization of pressure is a structural advantage, but the essential thing is that by the use of the ball chain or other suitable, flexible, substantially inextensible power transmission element, which enables differential movement of two adjacent oppositely disposed type bars, it is possible to position type bar 80 in juxtaposition to type bar 79, so that type bar 80, for instance, may travel a greater distance than type bar 79 to put, for instance, two capital "L's" which are differentially positioned on the type bar into the same printed line.

When the pattern bed is in its upper position the correction frame 74, and correction or restoring bar 73, rest against the pattern bed. The stop pins project above the frame and are free to be depressed to select a pattern by the mechanism previously described, and when the pattern bed goes down to be brought into operative association with the type bar assembly, the pattern remains unchanged. After the pattern has been selected and the pattern bed has gone down and the type bars have as a result been assembled in the line, it is necessary to bring the pattern bed back to the starting position so that the next pattern may be selected. Automatic means, not shown here, cause the restoring frame to go up more rapidly than the pattern bed so that all of the pattern pins are raised to the starting position so that when the pattern bed reaches the upper limit of its excursion it catches up with the restoring frame leaving the pattern pins free to be again selected and set.

All of the stops associated with the ball chains, however, must also be restored and this is accomplished by means which will hereinafter appear.

100 is a pull bar (Figures 1–14). It is caused to reciprocate by means not here shown. The link 101, pivoted to the driving shoes 102, carrying the bar 100 exemplifies such means. The bar 100 has a diagonal edge 103, notched at 104, to be engaged by spring pressed latches 105, one on each type bar drive head. When this bar is moved to the right in Figure 2, it pushes all of the type bars back to the starting position; as it moves to the left it draws them all forwardly. In its travel each type bar drive head engages and is directly stopped by a short pattern pin working through the chain assembly above described. The drive bar 100 is pivoted on a cross bar 106, on pivot pin 107. 108 is a guide slot associated with a stop pin 109 at the other end of the bar 100 and cross bar 106. The arrangement is such that for movement toward the right in Figure 2, for restoring the type bars to the starting position, all the type bars are simultaneously restored, but when moving toward the left in Figure 2, it might happen that all the letters in the line were the same, in which case the load on the mechanism involved in releasing all the spring latches 105 to release all the latches at once would be too great. The pivoted bar enables successive latches to be released thereby distributing the load.

Associated with the drive bar 100, is a chain stop restoring member 110, supported on levers 111, and urged to counter-clockwise movement by a spring 112, tending to raise the restoring member above the drive bar, which movement is limited by the rollers 113 which engage the under side of the pattern bed, thus as the pattern bed moves up out of working relationship with the type bars the restoring member follows it upwardly until it is in line with the stop members 94; then as the cross bar 106 moves to the right (Figure 2), carrying the drive bar with it the chain stop restoring member engages all of the chain stops 94 to return them and their associated chain structure to the initial starting position. When the pattern bed is brought down to select the next pattern, the rolls 113 depress the member 110 so that it does not interfere with any of the pattern pins or chain stop members.

If it should happen that no character had been selected on any one of the type bars subject to the control of the stop pins 94, such type bar in that case carrying a quad, as such type bar moves toward the printing position it pushes the stop member 94 out of the way to the position shown in Figure 5. When this happens the reset member 110 cannot get hold of the member 94 to return it, so means must be provided to move such stop member back into the path of the reset member 110.

The shaft 114, rotatably mounted in the pattern bed 65, has associated with it a lever 115 and a link 116 pivoted on one end of the lever and on the other end on a fixed abutment. Upward movement of the pattern bed rotates this shaft. The lever 117 on the shaft is in pivotal relationship with the link 118, which link carries a pin 119 free to travel along the slot 220, the pin as it travels engaging the stops 95, rotating or propelling the chain in counter-clockwise direction a distance sufficient to bring the stop member 94 into line with and, therefore, subject to be engaged by the member 110, so that the upward movement of the pattern bed before the drive bar and associated parts start back to the initial position operates to both return the stop pins to the starting position and to return the stops 94 to a position where they may be reset.

The shaft 114 extends clear across the frame. The pin 119 extends across and through the guide plates of the pattern bed. There is a lever 117 and a lever 118 for each space in which a ball chain is found, so that each chain is separately returned to a position where the reset member 110 may engage it.

With respect to those type bars which in the assembly of any line will not present characters for printing, there are three possible positions and three possible means of control. The type bar may be arrested by the justifying stop pin 120, or if that pin is not presented to it, it may be arrested by the normal quad stop pin 121, or if that is not used it will be positively and finally arrested by the fixed stop or abutment 122.

The justifying pattern pin 120 will be depressed by the plunger 59, controlled by the space bar. When this happens the type bar is arrested with a quad in the printing line, in such case the quad forms part of the justifying means.

Each type bar carries its own separate justifying means, comprising two flexible, spaced spring members 123—124, there being spacers 325 between them at the normal quad position to maintain them parallel and in alignment.

At the justification point these spring members 123 and 124 have opposed buttons 125 and 126. In front of these buttons pivoted between each pair of spring members 123 and 124 is a justifying wedge 127, having a tapered edge 128 adapted to engage the buttons and spread apart the spring members 123—124.

After the type bar is arrested by the justifying stop 120, the wedge 127 is rotated, the narrow part thereof 129 being free to penetrate between the members 123—124. The tapered edge 128 engages the buttons 125—126 spreading the members apart, and so expanding the quad and filling or closing the line.

This rotation is accomplished by the bar 130, extending across the bed, carried by the levers 131, on opposite sides of the bed on a shaft 132. The levers 133, one on each side of the bed, drive the shaft 132 by means not herein shown, through the spring diagrammatically shown at 134. The bar 130 rotates in a counter-clockwise direction as in Figure 23, to justify the wedges being thereby forced down between the springs 123—126. The wedge 127 has an ear 135, which upon return movement of the bar 130 in a clockwise direction is engaged to raise the wedge and free the justifying means.

When justifying is to take place all the type bars will be stopped in their proper places. Those type bars upon which characters to be printed in the line in question occur do not participate in the justifying act. Those type bars only which present a justifying quad will be expanded laterally between the abutments 137 and 138, so that the quads will be of equal width between each word, thus compensating for the variation in width of the characters and completely filling the line. Squeeze means are provided to change the distance between the abutments 137—138 to permit free movement of the type bars, added space being given to avoid binding and also to compensate for variation in the number of type bars presented to the printing line, which is necessary in view of the varying width of the various letters in any font of type. The line is, of course, fixed in length. The abutment 138 may be withdrawn for assembly, but when the impression is to be made the abutment is moved in to a fixed distance from abutment 137 equal to the length of the line.

If justification does not take place then the pattern pin 120 will not be forced down. Quad stop pin 121 will arrest the type bar bringing the quad spacer 325, as in Figure 21, into line with the printing area.

Under some circumstances when justification is not used, stop pin 121 serves as the quad stop for indenting, or when the tabular key is used also it may not be necessary or desirable with respect to every character space to provide a justified quad in which case the space or the quad will be obtained not by manipulation of the justifying stop, but by automatic operation of the quad stop 121.

The normal quad stop pin 121 will be controlled automatically by the movement of the pattern bed. Whenever the pattern bed goes down all of the normal quad pins 121 are normally projected, with the exception of certain pins which are held in the retracted position in connection with the necessity of pushing some of the letter bars out of register to compensate for the use of an extreme number of wide letters. This is accomplished by the movement of the typewriter carriage, which contacts the movable bar 223, supported in a guide member 224. The member 224 is secured to levers 225, which are pivoted at 226 to brackets 227 supported on the type bar bed. The levers 225 are actuated by a link connection 228, having one end pivoted on the levers 225 and the other end pivoted on the pattern bed cradle 66. When the pattern bed is in the raised position the levers 225 assume the position illustrated in Figure 1, and when the pattern bed is lowered the levers 225 are rotated in a clockwise direction and move the movable bar 223 and its guiding bar 224 into contact with the stop pins 121. The normal quad stop pins 121 are thus moved downwardly into the path of the type bar heads. Those drive members which are arrested by the justifying quad stop pins 120 will, of course, never reach the stop pin 121, but that makes no difference. Those drive members which pass normal quad stops 120 will be arrested by quad stop pins 121 unless the pins 121 are allowed to remain in the retracted position and this applies only to those normal quad stop pins associated with those type bars which are to be pushed off or allowed to pass beyond and so form no part whatever of the printed line.

Referring to Figures 11 and 12, the guide member 224 is recessed at 230. In the normal position or starting position, the movable member 223 is in the left-hand or starting position (Figure 11). The member 223 has two upstanding lugs 231 and 232, adapted to be engaged by a projection 233 on the plunger carriage 50. At the starting position the projection 233 is in the dotted line position of Figure 11. After a predetermined number of keys have been actuated the member 233 of the plunger carriage 50 engages the lug 232 and pushes the movable member 223 towards the right, Figure 11. In the normal position the member 223 is flush with the side wall 234, formed by the recessed portion 230 and when the member 223 is moved to the right it fills the recessed portion until a proper number of charactres have been selected to make a line. The quad stop pins 121, which are not covered by the movable member 223, will remain in the upper position when the pattern bed is lowered. When the plunger carriage 50 is restored to initial position the member 233 engages the extension 231 and pushes the movable member 223 back to initial position, Figure 11. The movable member is supported upon the guiding member 224 by a plurality of rollers 235.

Means for printing will now be described, (Figure 6). When the type bars are in selected line position a down squeeze bar 136 is lowered by any suitable means and the aligning members 237—238 engage the aligning lugs 139, which are positioned opposite the characters on the type bar. Thereafter, the side squeeze member 138 pushes the type bars together to a predetermined set line length. Thereafter, the wedges 127 are actuated by means of the bar 130 and the type bars are thus justified to fill the line.

The characters selected in line formation are then inked by the inking roll 140, which receives ink by means of a plurality of rollers 141—142—143—144. Ink may be supplied by means of an ink fountain 145, which may be adjustable by means of a setscrew 146. Any suitable means may be provided for moving the ink rollers to the dotted line position in Figure 6, and thereafter back to the full line position.

The printing device may comprise a frame 147, a pair of pressure bars 148—149, a platen 150, which may be adjustably secured to the frame 147, and shields 151—152, to protect the strip of paper 153. I have illustrated a roll of paper mounted upon a shaft 154. The paper strip passes about the platen 150, which is provided with a rubber insert 155, and thence passes between a driven roller 156 and idler rollers 157

at either side of the paper. After a line has been printed the roller 156 moves the paper 153 sufficient space for the next line. Any suitable means not herein illustrated may be provided for lowering and raising the printing frame and for propelling the paper.

After the line has been printed the type bars are restored to the normal position by means of the pull bar 100, above described. Thereafter a movable member 160 pushes the heads of the type bars against a fixed guiding member 161. In order to align the heads of the type bars with the guide plates 69 of the pattern bed, I have provided a plurality of aligning wedge members 162, mounted upon a shaft 163 (Figure 18). The shaft 163 is supported upon arms 164 pivoted at 165 to the type bar bed 68. A spring 169 normally pushes the wedge members 162 towards the right (Figure 18). When the arms 164 are rotated in counter-clockwise rotation (Figure 5), by a member 170, the inclined faces 171 of the wedge members 162 penetrate the spaces 172 between the type bars adjacent the heads 81—82, and spread the heads for proper alignment with the guide plates 69.

The wedge and aligning members 162 are mounted in a guiding member 173. When the pattern bed has been lowered the wedges 162 are retracted to the position illustrated in Figure 5.

The type bars have on their under faces the type characters which are to be reproduced. These characters must be protected against wear as otherwise they will be battered and distorted. The type bars travel upon a bed assembly, which includes the bed 68 and extension 174 mounted on the guide bar 173, and an upper bed 175. Each type bar is supported at four points. One of these supporting points is formed by the drive head 81 or 82 itself. The second is a boss 176, spaced behind the drive head by the spring 177. 178 is a third support. Immediately in front of the justifying portion of the type bar and 179 is the fourth at the extreme rear end of the type bar. The spacing of these four supports is such that always at least three of them are in contact with some part of the bed and three supports are always sufficient to maintain the type bars in proper alignment and support them on the bed proper for their longitudinal movement and protect them against direct contact with the bed surface.

The tapered type bars are relatively stiff and rigid. The drive heads are relatively heavy. They engage within the parallel channels or grooves formed in the pattern bed because the tapered type bars are alternately disposed and because different bars stop at different points, these bars will tend to move laterally as assembly takes place and while the drive heads are still under the influence and control of the pattern bed. The springs 177 are provided to permit lateral displacement and change in relative alignment of the various type bars without interfering with the parallel position of all of the type bar drive heads.

The pressure bars 148—149 do not themselves actually engage the type faces. There is a space between each successive character and the pressure bars 148—149 have lugs 180, which extend upwardly into the spaces between the characters so that the seating pressure to force the type bars upwardly against the pressure bar or abutment 136 is applied to the body of the bar and not to the type face itself. The rubber filler block 155, in the platen 150 insures that the paper will be brought into firm and snug contact with the entire line.

I have not pointed out in detail the inking mechanism. It is a well-known and standard type of mechanism to convey the ink from the ink well, distribute it and spread it over the successive rollers to make sure that the roller which finally contacts the type will be evenly inked.

The use and operation of my invention are as follows: using a conventional typewriter as shown in Figure 1, the operator writes a line of copy on paper placed around the platen thereof. The line so written can be inspected, checked and proofread. At the same time that this is done each typewriter key when struck selects and rotates a suitable shutter bar by means of the transmission mechanism. Because the plunger carriage travels in unison with the typewriter carriage, the plunger carriage will be spotted step by step successively over successive type bars and when the shutter bar depresses the plunger the plunger will depress the associated pattern pin to select the pattern. When the line is complete, there will be a pattern pin depressed for each character the line is to be and if justified a justifying stop will be depressed for each quad or blank space between the words in the line, if and where the space bar is used to make the space between the words. Only when the space bar is struck does the justifying quad stop come into operation and that is struck only for the quad between words. If a space is left for indentation, or if the tabular key is struck, then the regular or normal quad stop only comes into line with the type bar and the type bar then goes on beyond the point at which it would be arrested by the justifying stop to engage the normal quad stop or pin. This applies only to the correct number of type bars necessary to fill the line; the remaining type bars will not be arrested by the normal quad stops but will go on even further to engage the fixed stop, arresting those additional type bars at a point such that they clear the printing zone so as not to interfere with the assembly of the characters in the completed line for printing.

Thereupon the operator will touch a button to start the automatic driving and operating mechanism to cause the pattern bed to be lowered into operating relationship with the type bar head. When this lowering is completed the cycle will continue and the drive bar will draw all of the type bars downwardly, each successive drive head as it reaches the appropriate pattern pin, or as the stop connected to it by the ball chain reaches it will be stopped, disconnected from the drive bar and be left in position. Thus there will be assembled across the printing area a line of characters exactly the same as the line of characters typewritten on the typewriter.

Depending upon the width of characters in a line, a greater or less number of the type bars will, when associated with the justifying mechanism be needed to make up a line. If all the characters are narrow, perhaps all the strips in the bed will be used. If all the characters are wide, "W" or "M" for instance, there will only be room for part of the bars.

Counting means or metering means, forming no part of the present invention, and so not illustrated, will be used to determine in advance how many of the type bars will be excluded. The type bars to be excluded will not be arrested by the justifying stop pins on the quad, but will

go on to the fixed stop and their ends will clear the printing area. Then the abutments on both sides of the type bars will be forced together in consonance with the outward expansion of the wedges in the justifying ends of the bars which carry the quads and the line will be locked in place.

The aligning bars will then engage the lugs on the upper sides of the type bars to align them properly and this takes place at or just before the time when the side abutments squeeze the bars laterally and before justification.

When the line is locked up, then the pattern bed commences to rise. First the correction frame rises to draw all the stop pins back to the starting position. Then the bed continues its upward movement so that the next selection by the typewriter may take place.

Meantime the pressure bars rise to force the type bars upwardly against the abutment, the inking roll comes up to ink the line of type, is withdrawn and the platen and the paper is pressed against the line of type; the impression is made, the platen and paper descends, the paper strip is then moved by the roller to present a new blank space to the type and the pressure is released both laterally and vertically and the drive bar successively engages the type bars on its upward movement and returns them to the starting position ready for the next cycle of operation.

The pattern bed which during selection is interlocked with the drive heads on the character or type bars, releases them completely when the pattern bed starts its upward movement. This is important, because it leaves the selected type bars now held in alignment by the aligning bars free to move transversely in connection with the justifying action, and when the pattern bed comes down again after the bars have been returned to their starting position the wedges first position the type bars on the bed so that the final movement of the pattern bed may bring each type bar head into correct alignment with the elements on the pattern bed with which it is to cooperate.

While the printing cycle is going on the next line can be written, because the pattern bed, during the time when the line is being written and the pattern is being selected on the bed is up out of register with and has no working connection with the type bars. In other words, the movable pattern bed acts as an intermediary element, being sometimes in working relationship with the selecting means including the typewriter, and sometimes in working relationship with the type bars.

I claim:

1. In a composing machine, a typewriter and pattern bed, a plunger carriage movable across the pattern bed in coordination with the movement of the typewriter carriage, the plunger carriage having a plurality of plungers, one for each pin in a line of pins in the pattern bed, a shift key on the typewriter, and a motion-transmitting mechanism interposed between each key of the typewriter and two of the plungers in the plunger carriage, means controlled by the shift key for selectively determining which of the two plungers will be actuated by the typewriter.

2. In combination, two opposed, slotted, rock links, a connecting rod associated with each of them, a pin-selecting device adapted to be actuated by each connecting rod, a typewriter having a shift key and a connection between the shift key and the two slotted links, whereby they may be displaced in a plane parallel with the axis of their opposed slots, a type key on the typewriter, a connection between it and said links, said connection being common to both, a guide means adapted to maintain the connection in cooperation with one of said links only, when the type key is actuated.

3. In a composing machine, a pattern bed having a plurality of rows of pattern pins, and two stop pins in line with each row of pattern pins.

4. In a composing machine, a pattern bed having a plurality of rows of pattern pins, and two stop pins in line with each row of pattern pins, and a fixed stop abutment in line with said row of pattern pins, and on the side of the stop pins furthest therefrom.

5. In a composing machine, a pattern bed, a plurality of rows of pattern pins, pins in each alternate row extending substantially through the bed, the pins of each intermediate row terminating within the body of the bed, a flexible member having two projecting elements, one adapted to project below the bed a distance substantially equal to the projection of the longer pins, and the other adapted to be engaged by the shorter pins.

6. In a composing machine, a pattern bed, having alternate rows of long and short pattern pins, the long pins projecting outwardly from the bed, a cable-like flexible member, a guide means therefor, the flexible member including a stop lug adapted to project outwardly from the plane of the bed in a manner similar to the long pins, and an opposed projecting member within the bed adapted to cooperate with the short pattern pins.

7. In a composing machine, a pattern bed, a flexible cable-like member having an element projecting outwardly beyond the plane of the bed, and an opposed member projecting inwardly into the bed, stop pins, some of them adapted to project selectively from the bed, and others adapted to be projected into opposition to the element projecting from the cable-like member, reciprocating members adapted to be arrested by some of the pins in the pattern bed, means adapted to displace the flexible member and stop it in its movement, and automatic means for returning the flexible member to its starting position.

8. In a composing machine, a plurality of longitudinally displaceable character strips arranged side by side and oppositely tapered, the characters on alternate strips being oppositely positioned, a means adapted to be projected into the path of each strip to stop it, a typewriter and control means interposed between it and the stop means, the stop means being adapted to arrest each character strip when the selected character is properly positioned irrespective of the direction of the taper of the strip.

9. In a composing machine, a plurality of longitudinally displaceable, oppositely tapered, character strips, means for longitudinally displacing them, the characters on the alternate strips being arranged in inverse order, means for selecting the point at which each strip will be arrested, a typewriter adapted to control said selecting means and transmission means interposed between the typewriter and the stop means adapted to arrest any selected character strip in position with the selected character in printing position irrespective of the strip arrested.

10. In a composing machine, a plurality of character strips the characters on each strip being in a single plane, means for longitudinally and rectangularly displacing them, a printing zone intersecting the line of movement of the strips, means for selectively arresting the strips with the selected characters in line with the printing zone, means for inking the line of selected characters, means for presenting a continuous strip of material to the line of characters for printing, and means for step by step feeding and presenting the strip to successive lines of selected characters.

11. In a composing machine, a plurality of character strips arranged side by side, means for longitudinally reciprocating them, a spring-pressed hook on the end of each character strip, a drive head having a member adapted to interlock with each of the spring-pressed hooks, the member being pivotally mounted in the plane of movement in the characters, whereby as the strips are moved in one direction they are staggered, and as they move in the oppostie direction they are held in alignment perpendicular to the direction of reciprocation.

12. A character strip for composing machines and the like comprising a tapered character-carrying body, a drive head at one end of the body and flexible connection between them, justifying means at the other end of the body including a pair of parallel spring members in alignment with the body of the strip.

13. A character strip for composing machines and the like comprising a tapered character-carrying body, a drive head at one end of the body and flexible connection between them, justifying means at the other end of the body including a pair of parallel spring members in alignment with the body of the strip, means mounted on the character strip adapted to penetrate between the spring members and spread them apart.

14. A character strip for composing machines and the like comprising a tapered character-carrying body, a drive head at one end of the body and flexible connection between them, justifying means at the other end of the body including a pair of parallel spring members in alignment with the body of the strip, means mounted on the character strip adapted to penetrate between the spring members and spread them apart, means for moving the character strips longitudinally and means in the path of their travel adapted to engage and operate the spreading means to spread the spring members apart.

15. In a composing machine, a plurality of character strips the characters on each strip being in a single plane, means for displacing them longitudinally and rectangularly and for arresting them in a selected position, means for expanding some of the strips to displace some of the strips laterally, means for subsequently returning the strips laterally to their original positions.

16. In a composing machine, a plurality of character strips, means for displacing them longitudinally and for arresting them in a selected position, means for expanding some of the strips to displace some of the strips laterally, means for subsequently returning the strips laterally to their original positions, said means including fingers adapted to penetrate between adjacent strips and cam them laterally back to the starting position.

17. In a composing machine, a plurality of character strips, each of them having on one face thereof all the characters of the font of type and each of them having a quad surface thereon, means for displacing the strips longitudinally and for arresting selected strips in position with selected characters in alignment, means for arresting some of the strips in such position that the entire strip passes beyond the line of characters extended, means for applying lateral pressure to the remainder of the strips and means for expanding some of the strips laterally, the expanding means being associated with the quad surfaces.

18. In a composing machine, a plurality of character strips, each of them having on one face thereof all the characters of the font of type and each of them having a quad surface thereon, means for displacing the strips longitudinally and for arresting selected strips in position with selected characters in alignment, means for arresting some of the strips in such position that the entire strip passes beyond the line of characters extended, means for applying lateral pressure to the remainder of the strips and means for expanding some of the strips laterally, the expanding means being associated with the quad surfaces, means for returning all strips to the starting position and displacing the strips laterally to align them with the stop mechanism.

19. In a composing machine, a character strip bed, a plurality of character strips mounted thereon, means for longitudinally displacing them therealong, raised characters on the under edge of each strip, the bed being discontinuous, a plurality of lugs projecting downwardly from each character strip and engaging the floor of the bed, said lugs being so placed that at least three lugs are always in engagement with some part of the floor of the bed to hold the characters out of contact therewith.

20. In a composing machine, a character strip, two spring fingers projecting beyond the end thereof, a rock member pivoted between said spring fingers, and a cam associated therewith adapted to penetrate between the spring fingers, and means for rotating the cam including an actuating cam member, projecting upwardly out of line with the character strip, an abutment adapted to be engaged thereby, means in opposition thereto for rotating the cam.

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