No. 622,989. Patented Apr. 11, 1899.

W. E. BERTRAM.

MONOLINE TYPE COMPOSING AND CASTING MACHINE.

(Application filed Dec. 13, 1898.)

(No Model.) 7 Sheets—Sheet 1.

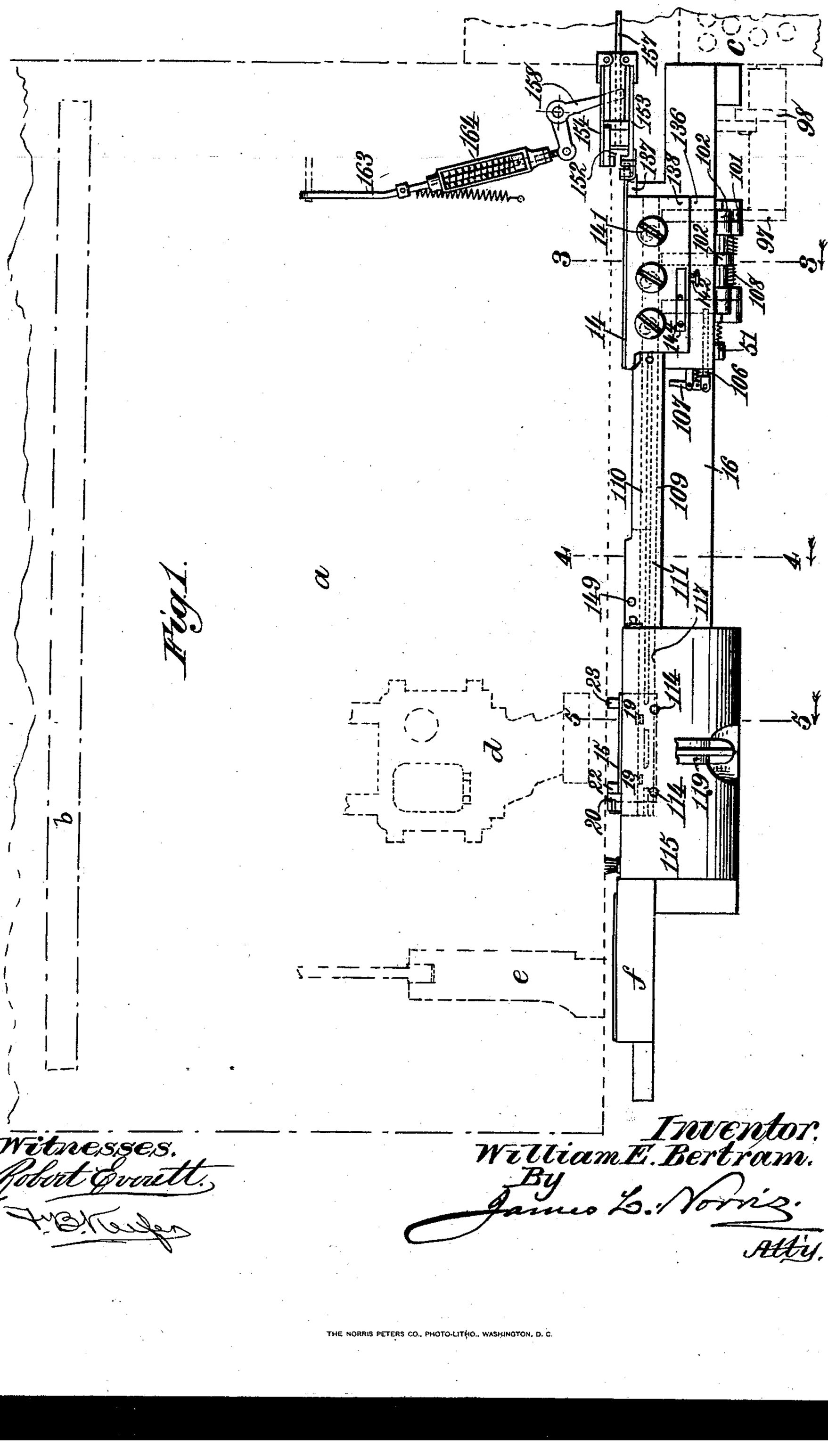

Fig. 1.

Witnesses.
Robert Gwatt.
F. B. Taylor

Inventor.
William E. Bertram.
By
James L. Norris.
Atty.

No. 622,989

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(No Model.)

7 Sheets—Sheet 2.

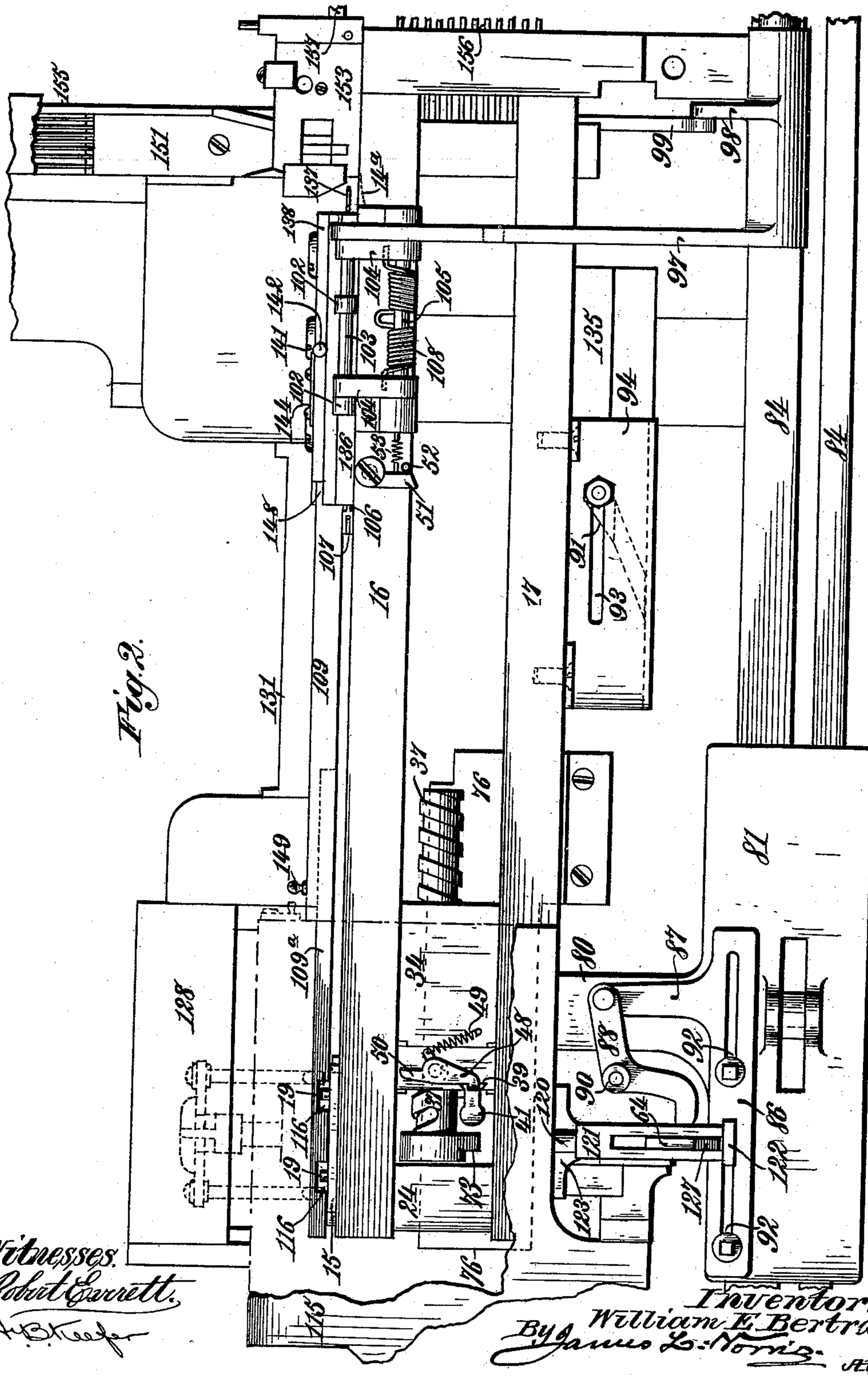

Fig. 2.

Witnesses.
Robert Garrett.
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(No Model.) 7 Sheets—Sheet 3.

Fig. 5.

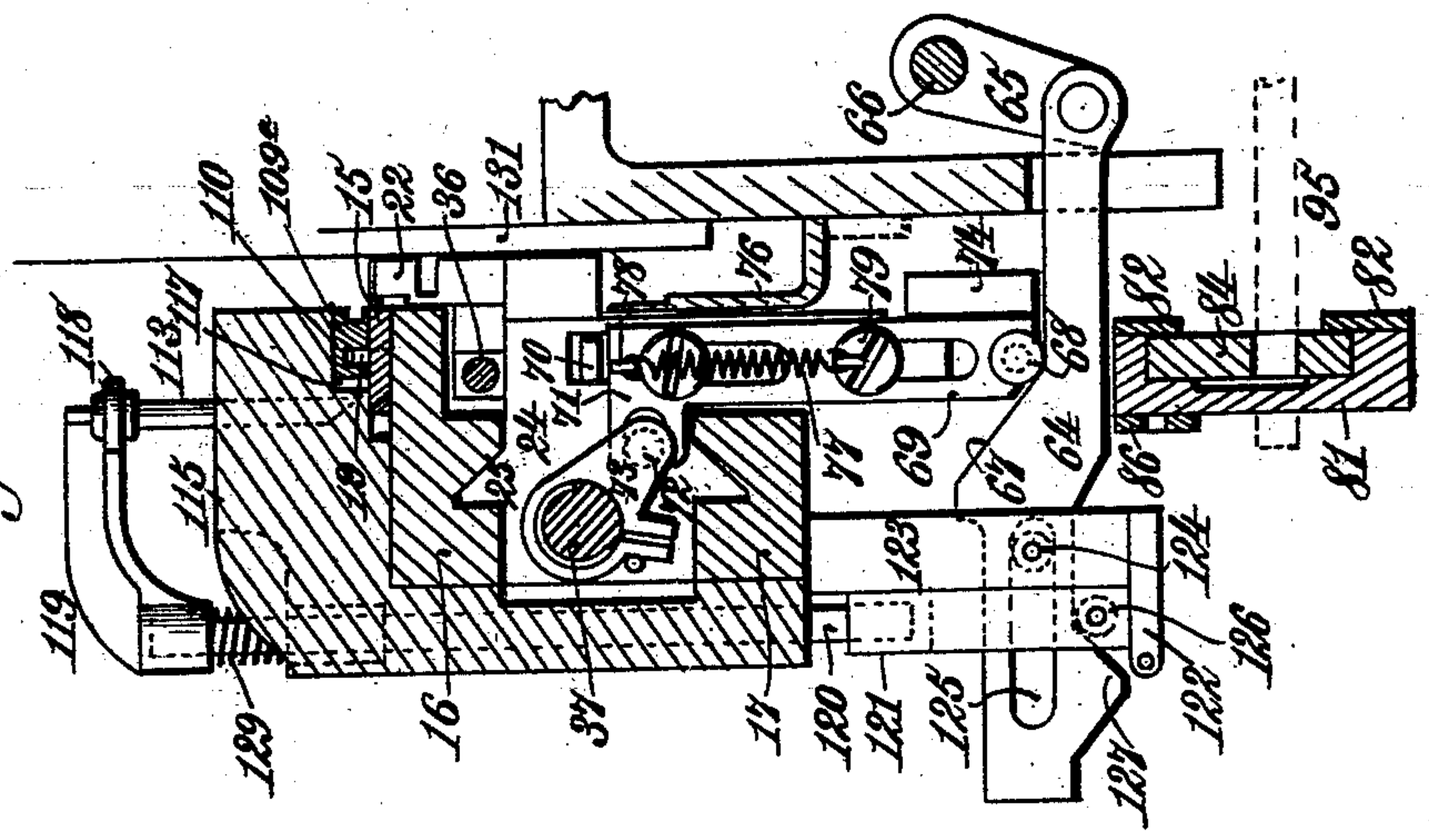


Fig. 4.

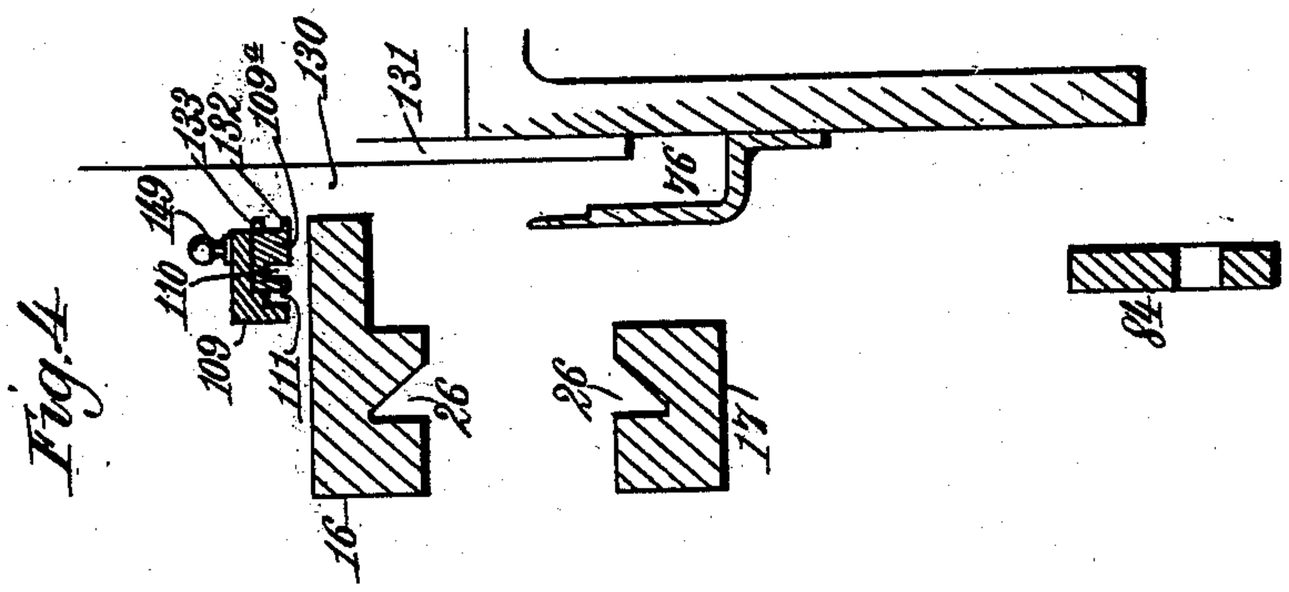
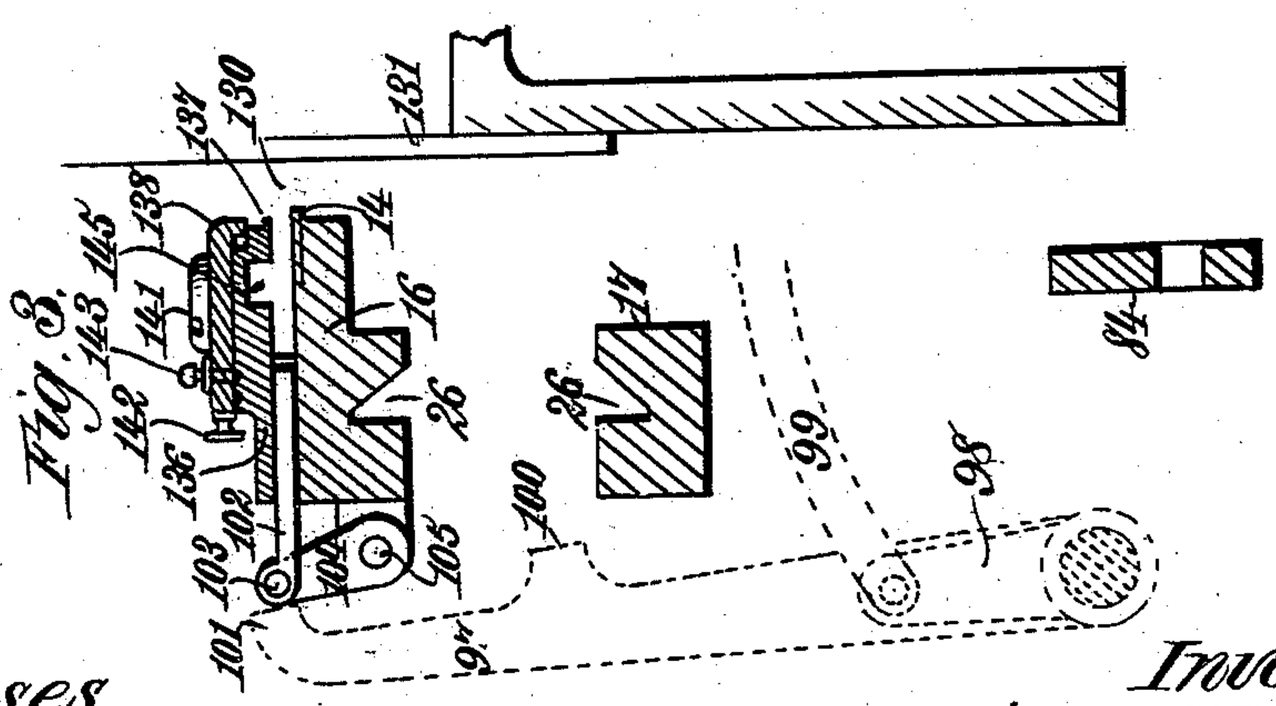


Fig. 3.



Witnesses.
Robt Ewett.
J. B. Keefer

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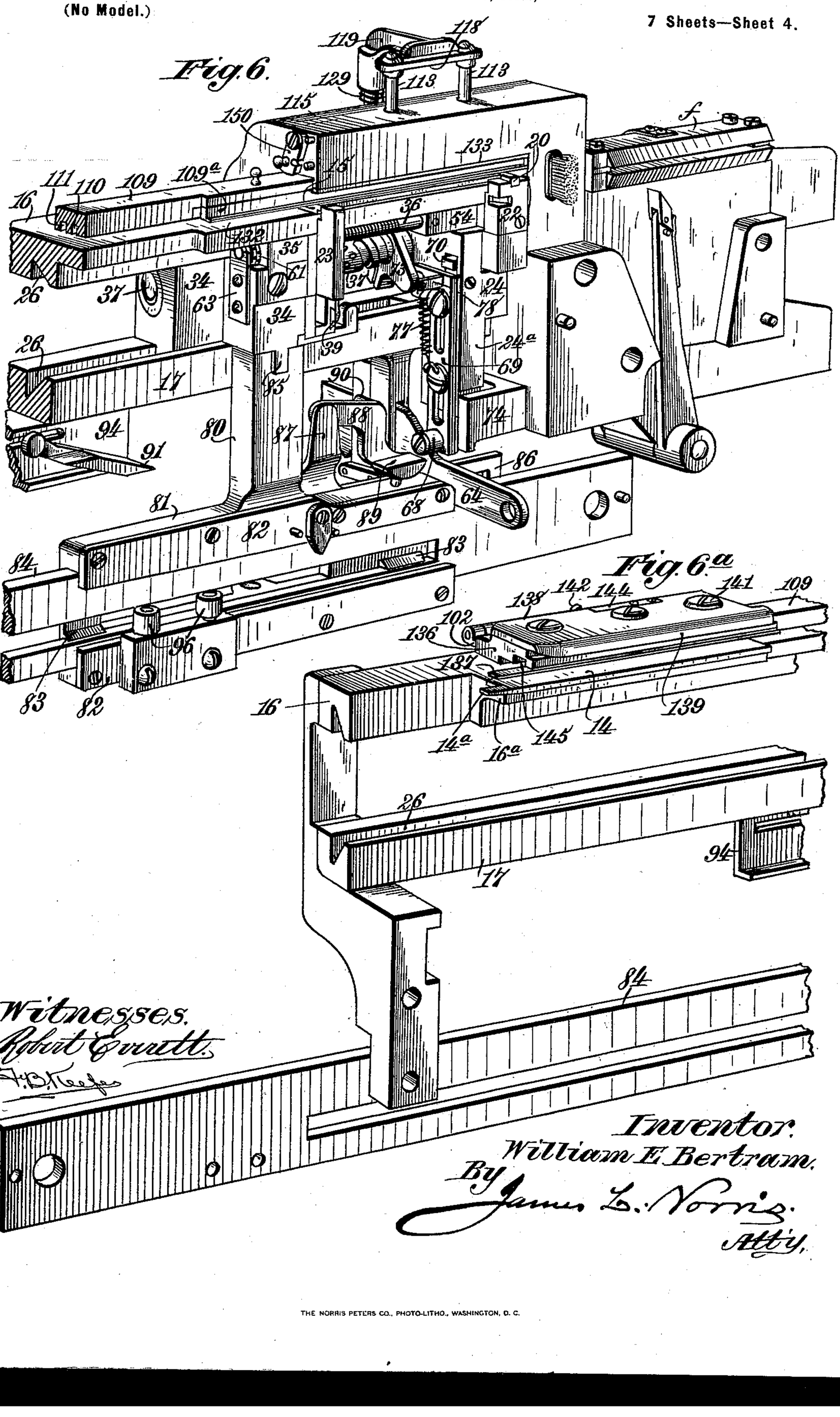
(Application filed Dec. 13, 1898.)

(No Model.) 7 Sheets—Sheet 4.

Fig. 6.



Witnesses.
Robt Ewett.
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No. 622,989. Patented Apr. 11, 1899.

W. E. BERTRAM.

MONOLINE TYPE COMPOSING AND CASTING MACHINE.

(Application filed Dec. 13, 1898.)

(No Model.) 7 Sheets—Sheet 5.

Fig. 7.

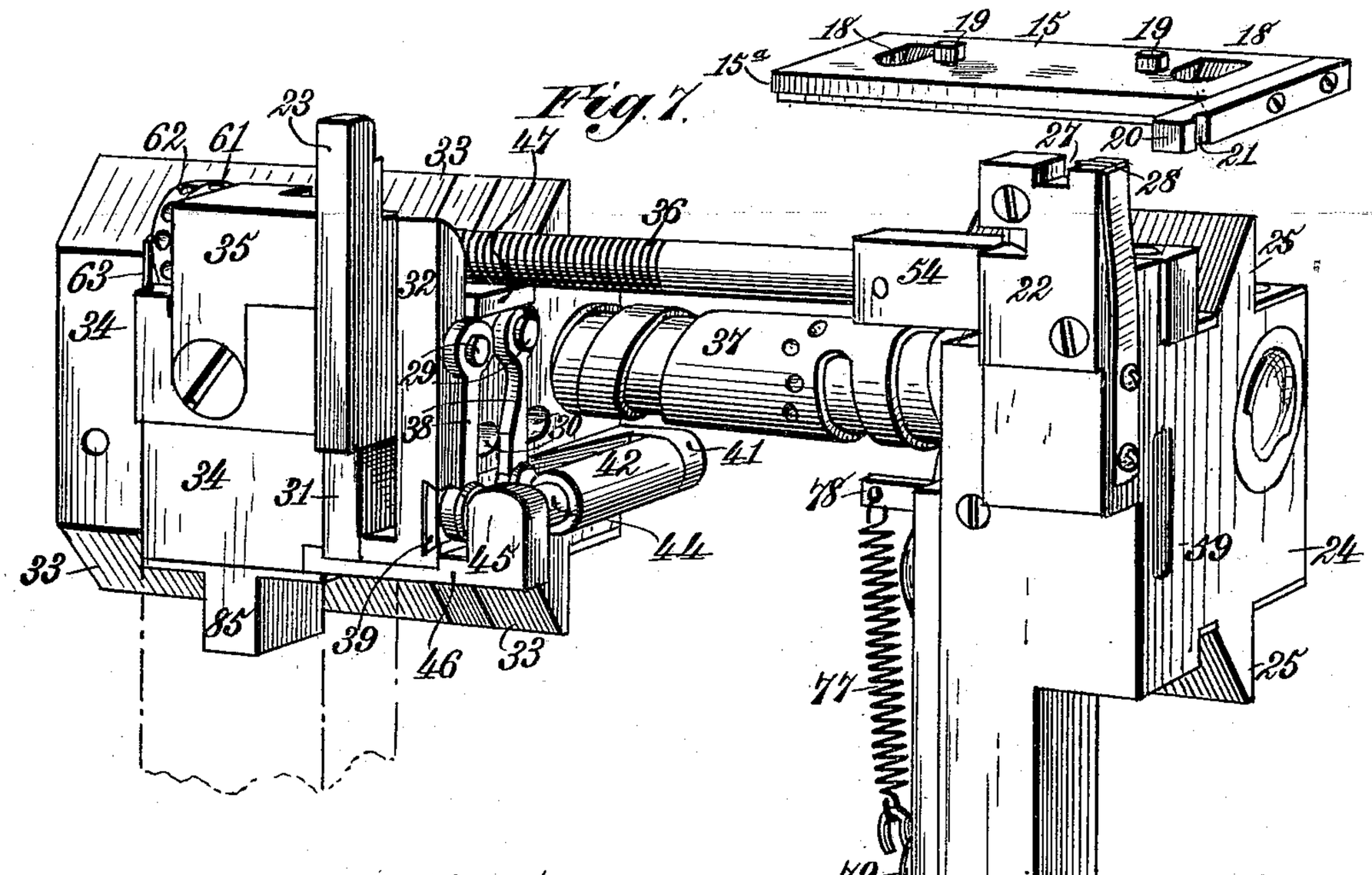


Fig. 8.

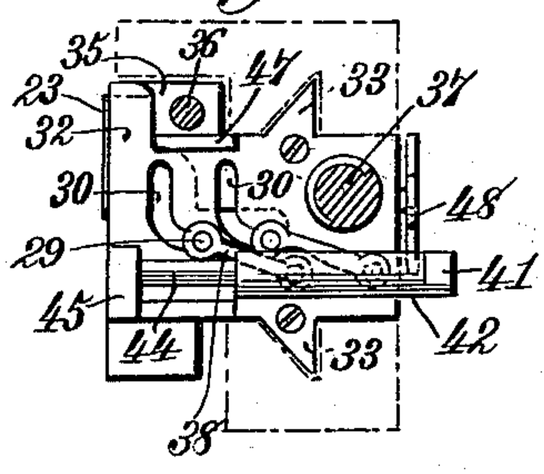


Fig. 11.

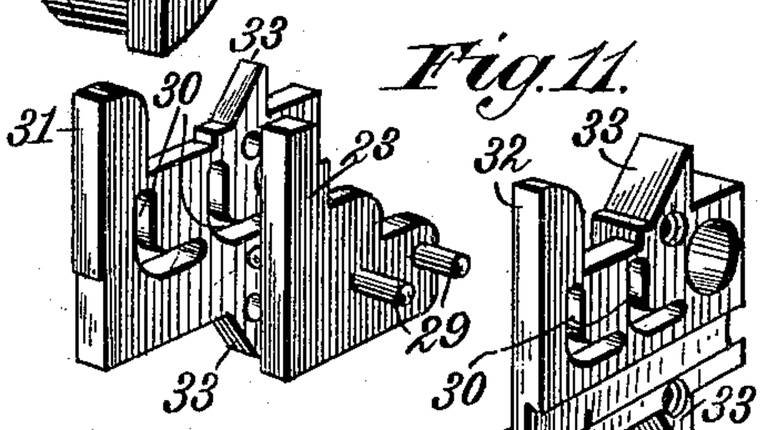


Fig. 9.

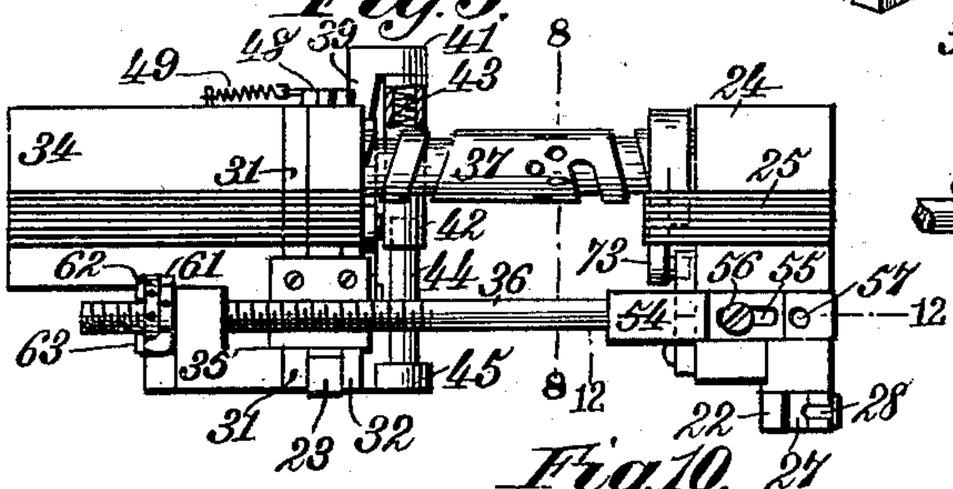


Fig. 10.

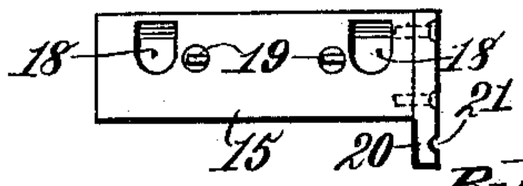
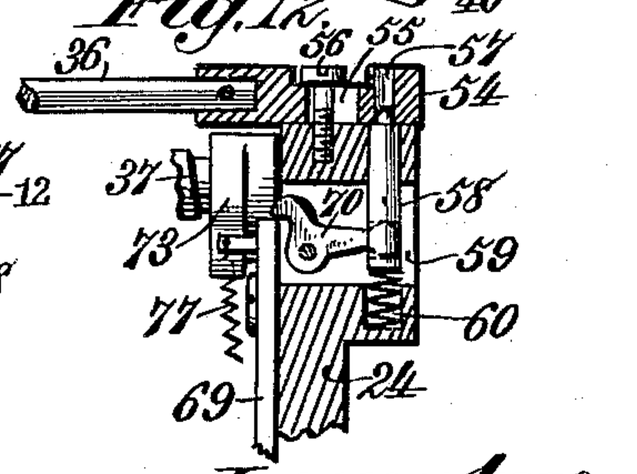


Fig. 12.



Witnesses.
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No. 622,989. Patented Apr. 11, 1899.

W. E. BERTRAM.

MONOLINE TYPE COMPOSING AND CASTING MACHINE.

(Application filed Dec. 13, 1898.)

(No Model.) 7 Sheets—Sheet 6.

Fig. 13.

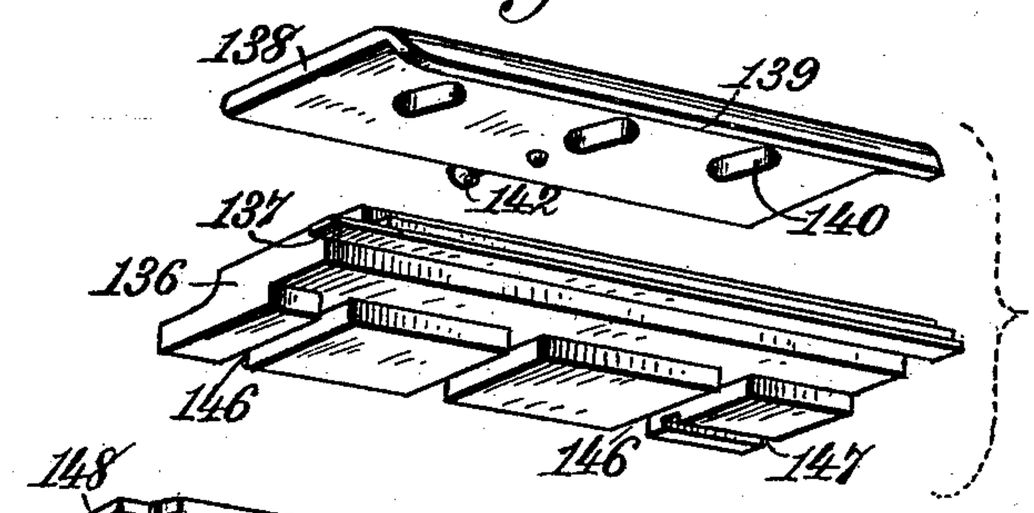


Fig. 14.

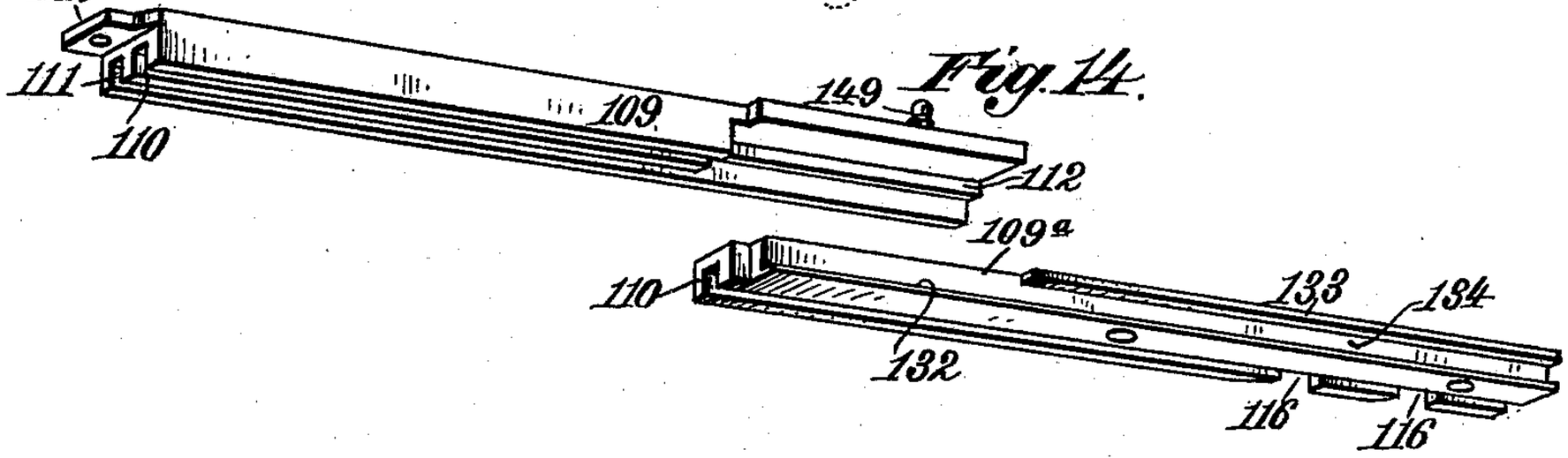


Fig. 15.

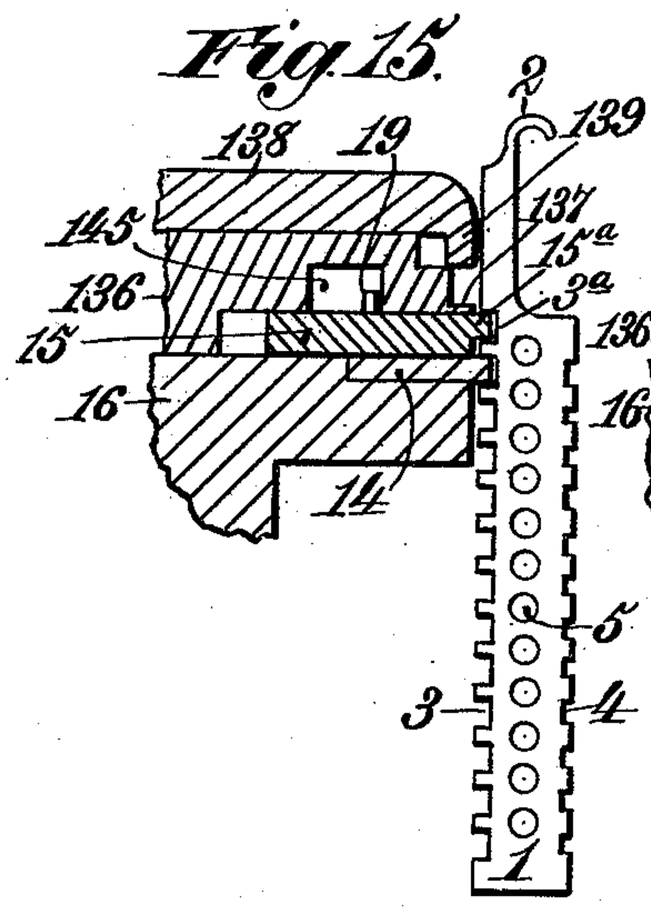


Fig. 16.

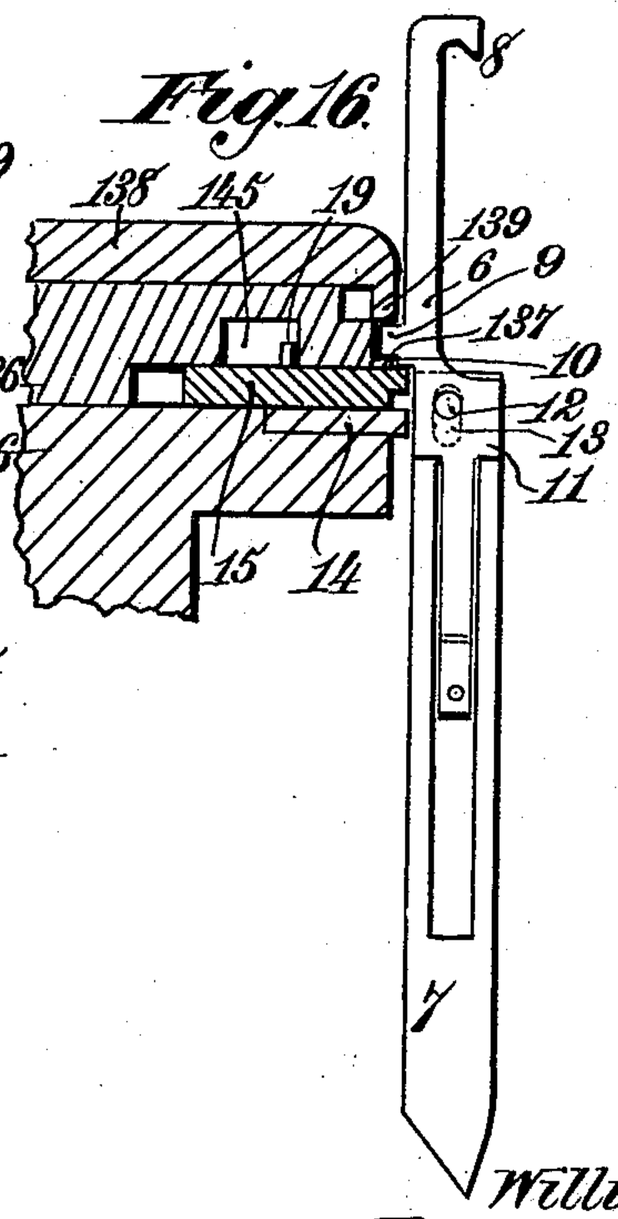
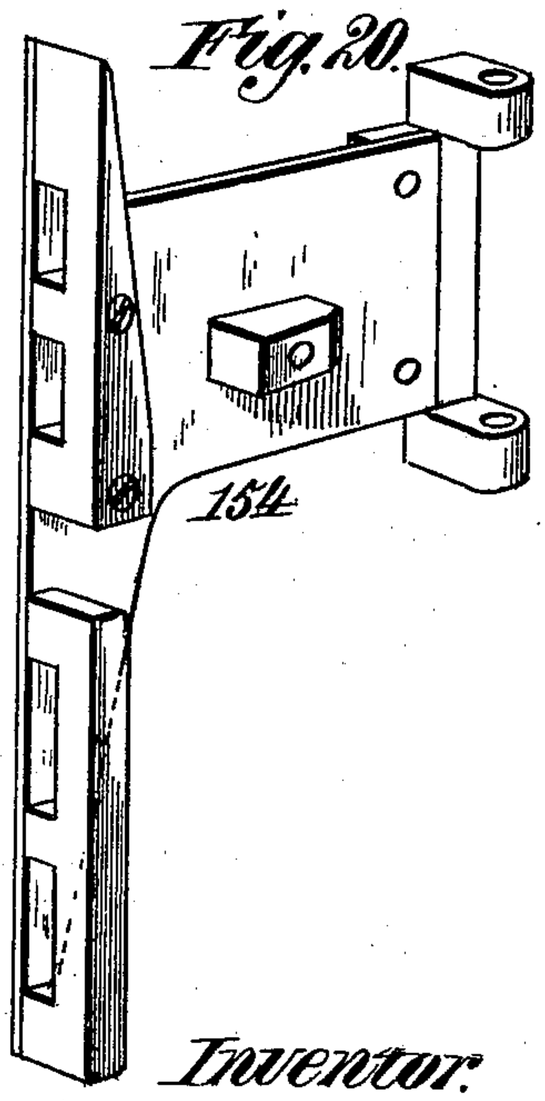


Fig. 20.



Witnesses.
Robt Everett.
F. B. Tooker

Inventor.
William E. Bertram.
By James L. Norris.
Atty.

No. 622,989. Patented Apr. 11, 1899.

W. E. BERTRAM.

MONOLINE TYPE COMPOSING AND CASTING MACHINE.

(Application filed Dec. 18, 1898.)

(No Model.) 7 Sheets—Sheet 7.

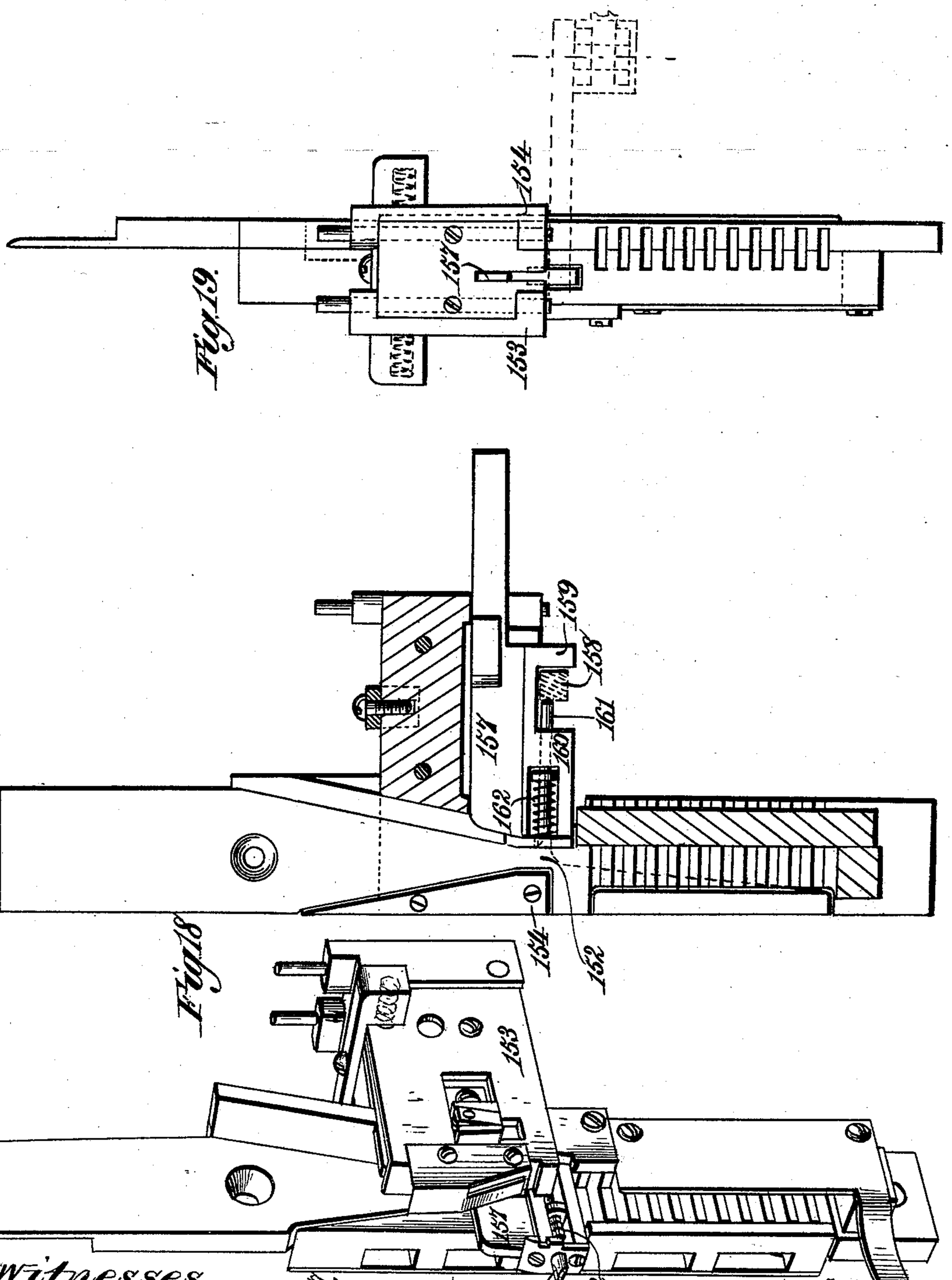


Fig. 19.

Fig. 18.

Fig. 17.

Witnesses.
Robert Gwatt.
A. B. Keefer

Inventor.
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By James L. Norris.
Atty.

UNITED STATES PATENT OFFICE.

WILLIAM ERNEST BERTRAM, OF NEW YORK, N. Y., ASSIGNOR TO THE MONOLINE COMPOSING COMPANY, OF WASHINGTON, DISTRICT OF COLUMBIA.

MONOLINE TYPE COMPOSING AND CASTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 622,989, dated April 11, 1899.

Application filed December 13, 1898. Serial No. 699,146. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM ERNEST BERTRAM, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented new and useful Improvements in Monoline Type Composing and Casting Machines, of which the following is a specification.

My invention relates to a monoline type composing and casting machine of the general character described and shown in United States Letters Patent No. 506,198, dated October 3, 1893, and No. 605,141, dated June 7, 1898, both issued to W. S. Scudder, assignor to The Monoline Composing Company.

The invention comprises certain improvements in the matrix bars and spacers, the alining-bars, the line-carriage, mechanism for controlling a traveling alining-bar that moves with the carriage and is independently movable to and from the line of matrix-bars, justifier devices, and assembly-box mechanism, as hereinafter more particularly described.

In the annexed drawings, illustrating the invention, Figure 1 is a partial diagrammatic plan of a monoline composing-machine comprising my improvements. Fig. 2 is a partial front elevation of the same. Fig. 3 is a transverse sectional elevation on the line 3 3 of Fig. 1. Fig. 4 is a similar section on the line 4 4 of Fig. 1. Fig. 5 is a similar section on the line 5 5 of Fig. 1. Figs. 6 and 6ª when taken together show in perspective the line-carriage, a portion of the justifying mechanism, and that part of the frame which includes the upper and lower guide-rails with detail parts viewed from within the machine. Fig. 7 is a view in perspective of the line-carriage and traveling alining-bar. Fig. 8 is a transverse vertical section of the carriage on the line 8 8 of Fig. 9. Fig. 9 is a plan of the line-carriage. Fig. 10 is a plan of the traveling alining-bar. Fig. 11 is a perspective of the movable carriage-jaw and its adjacent guide-plates. Fig. 12 is a vertical section of a portion of the carriage on the line 12 12 of Fig. 9. Figs. 13 and 14 are detail views of guides and bearings for the spacers and traveling alining-bar. Fig. 15 shows a matrix-bar in engagement with the stationary assembly alining-bar and the traveling alining-bar. Fig. 16 shows an expansible spacer-bar in suspended engagement with a stationary supporting rib or flange and with the traveling alining-bar. Fig. 17 is a perspective of the assembly-box. Fig. 18 is a vertical section of the same. Fig. 19 is an end elevation of the assembly-box. Fig. 20 is a view of one of the wings or gates of the assembly-box.

The general construction and arrangement of the essential parts of a monoline composing-machine, so far as shown in Figs. 1 and 2, is similar to that disclosed in said former patents, Nos. 506,198 and 605,141, to W. S. Scudder, and it may be remarked that for this reason only those parts relating to or constituting the present improvements are herein described in detail, reference being had to the specifications and drawings of the above-named patents for a full explanation of those things which are not herein described in detail with regard to their specific construction and mode of operation.

Before proceeding to an explanation of my improvements it may be well to say that, in Fig. 1, *a* designates the position of the usual bed-plate, *b* the main line-shaft, *c* the keyboard, *d* the casting-pot, and *e* the ejector, and *f*, Figs. 1 and 6, the trimmer, all of which are described in the former patents.

Matrix-bars and spacers.—As in the patents before named, there is employed in the present machine an assortment of ninety-six different characters, divided into eight groups of twelve each and in which the characters included in each group differ from those included in the other groups. For the purpose of conveniently disposing these ninety-six different characters there are employed eight species of matrix-bars, each carrying twelve characters on one vertical edge, and from these matrix-bars any required character can be quickly selected for use in composing a line that will accord with the requirements of all ordinary printing conditions.

Each matrix-bar 1, Fig. 15, is provided at its upper end with a hook 2, differing in length from similar hooks on bars of a different species. On its rear edge each matrix-bar has, say, thirteen alining-notches 3 and 3ª or one

more than the number of characters or intaglio-type matrices 4 on its front edge. The lowermost alining-notches 3 correspond in number and position to the characters on the front edge of the matrix-bar, and the additional alining-notch 3^a is located at the top of the series of such notches. In each matrix-bar there is provided a vertical series of perforations 5 to receive at any height on said bar a longitudinally-movable pin, hereinafter described, that will prevent the matrix-bar from turning or from dropping down while the matrices are being assembled. The additional alining-notch 3^a and the perforations 5 are features peculiar to this improved matrix-bar.

Each spacer-bar is composed of two sections 6 and 7, Fig. 16, that are put together and combined for joint operation substantially in the manner described in United States Letters Patent to W. S. Scudder, No. 494,899, of April 4, 1893, and No. 506,198, of October 3, 1893. The upper section 6 has a hook 8 and is formed on its rear edge with a lug 9, having a jog or recess 10 in its lower corner. The cheeks 11 of the upper spacer-section are provided with perforations 12, that register with each other, and in the intermediate wedging portion of the lower spacer-section there is an elongated slot 13, (shown by dotted lines in Fig. 16,) that is adapted to register with said perforations, so that the spacer can be engaged with the before-mentioned pin in assembling a line. The specific form of the lug 9 and the provision of the perforations 12 and slot 13 are novel features in the construction of this spacer-bar. As in the patents before named, the lower expander-section 7 of this spacer enters between the cheek-pieces 11 of the upper section 6 and is longitudinally movable between the same for the purpose of expanding or spreading them apart in the justification of a line of matrices. The hooks 2 and 8 on the matrix-bars and spacer-bars are for distributing purposes, as in the aforesaid former patents.

Alining-bars.—There are two alining-bars employed in this improved monoline-machine. First, a stationary assembly alining-bar 14, Figs. 1, 3, 6^a, 15, and 16, on which to assemble the matrix-bars by means of their alining-notches 3; second, a traveling alining-bar 15, Figs. 1, 2, 5, 6, 7, 10, 15, and 16, which is made to travel in a horizontal plane above the plane of the stationary or assembly alining-bar 14, and therefore necessitates the provision of the additional alining-notch 3^a in the back of each matrix-bar 1, so that if any matrix-bar is dropped to its lowest operative level, as shown in Fig. 15, to present the required character at the desired point in the line of matrices there will be an alining-notch, as 3^a, at a suitable elevation to be engaged by the traveling alining-bar 15 before the line of assembled matrices is moved off from the stationary assembly alining-bar.

The thickness of the assembly alining-bar 14 is somewhat less than the height of each alining-notch 3 in the back edge of each matrix-bar, so as to allow the matrices to assemble easily and prevent wear of said notches. This also prevents the assembling mechanism from slowing up, as it is liable to do when the assembly-bar is the same size as the alining-notches in the matrix. The traveling alining-bar 15 maintains the alinement of the matrices when the matrix-bars are moved off from the stationary assembly-bar 14, and the thickness of said traveling bar 15 should therefore be as near as possible the size of the alining-notches 3 and 3^a, say about one two-thousandths of an inch smaller.

As shown in Figs. 3 and 6^a, the stationary assembly alining-bar 14 is attached to or may form part of the upper one of a pair of longitudinally-grooved guide-rails 16 and 17, Figs. 2 to 6^a, between which are guided the upper portions of a line-carriage, hereinafter described. The stationary alining-bar 14 is located near the assembly-box, hereinafter described, and its front edge projects beyond a forward-extended portion 16^a of the upper guide-rail 16, as shown in Fig. 6^a, while the top of said bar is flush with the top of said rail. To facilitate engagement of the matrix-bar notches 3 with the assembly alining-bar 14, the latter is preferably reduced in thickness at one end 14^a, Figs. 2 and 6^a, which projects toward the assembly-box or beyond the adjacent end of the forward-extended portion 16^a of the guide-rail 16 or other fixed support.

The traveling alining-bar 15 (see Figs. 7 and 10) is provided with parallel slots or perforations 18, that are extended transversely. One end of each slot 18 is beveled downward and inward, as shown, and its other end is preferably rounded. These slots 18 are for the engagement of mechanism whereby the traveling alining-bar is to be moved away from the line of matrices to release the matrix-bars and allow them to be depressed after the casting of a type-high printing-bar. On the top of the traveling alining-bar 15 there are lugs 19, Figs. 1, 2, 5, 7, and 10, for guiding said alining-bar, as hereinafter explained, in its movements with the line-carriage to and from the casting-point. On one end of this traveling alining-bar 15 there is a lateral projection 20, Figs. 1, 6, 7, and 10, having in one side a rounded or beveled notch 21 for engagement with a spring-latch on a slotted or recessed part of the line-carriage. The operative edge of the traveling alining-bar 15 is formed along the top with a flange or rib 15^a, Fig. 7, so that said traveling bar 15 can occupy position directly above and upon the stationary alining-bar 14 and yet be readily engaged with the alining-notches 3 or 3^a of the matrix-bars 1, as shown in Fig. 15, after a line of matrices and spacers has been preliminarily assembled.

It will be understood that the traveling alining-bar 15 is a novel feature of the pres-

ent machine and that by its employment any wear of the matrix-bar alining-notches is reduced to a minimum.

Line-carriage.—The upper portion of the line-carriage comprises a fixed jaw 22 and a movable jaw 23, Figs. 1, 6, 7, and 9, between which jaws will be clamped the assembled line of matrix-bars and spacers to be conveyed to the various mechanisms that are to successively act upon said line. As shown in Figs. 7 and 9, the fixed carriage-jaw 22 is secured to or may form part of a slide-block 24, that is provided at top and bottom with beveled guide projections 25 to run in corresponding grooves 26 of the guide-rails 16 and 17, Figs. 3 to 6. A slot 27, Figs. 7 and 9, is provided in the fixed carriage-jaw 22 to receive the projection or arm 20 of the traveling alining-bar 15, which then becomes yieldingly connected with the carriage by means of a spring-latch 28, snapping into the notch 21 of said arm or projection 20, so that the traveling alining-bar 15 can move with the line-carriage and yet be independently movable to and from the line. The movable jaw 23 is provided on each side with two pins 29, Fig. 11, which work in guideways 30, formed in vertical guide-plates 31 32, that are provided at top and bottom with beveled projections 33, in line with similar projections or ribs on a closely-adjacent slide-block 34, Figs. 7 and 9, to move therewith in the grooves 26 of the guide-rails 16 and 17, which form part of the framework of the machine. On the slide-block 34 there is secured a bearing-block 35, that supports the screw-threaded end portion of a rod 36, the other end of which has a locking and unlocking connection with the fixed carriage-jaw 22, as presently explained. There is also a screw-shaft 37, Figs. 2, 5, 6, 7, 8, 9, and 12, that engages the slide-blocks 24 and 34, Figs. 6 and 7, thus connecting the fixed and movable jaws of the line-carriage, so that said jaws and connected slide-blocks can be separated sufficiently to permit reception of the matrix-bars and interposed spacers and allow the same to be removed for distribution to their appropriate magazine-compartments.

The movable carriage-jaw 23 is the one that is nearest the assembly-box, hereinafter described, and this jaw is so formed that the portion thereof which comes next to the mold at the casting-point is the same width as the matrix and comes close to the mold, thus preventing any squirting or leakage of molten metal at this point. The making of the movable jaw 23 the same width as the matrix requires that in gripping the line the said jaw 23 should be moved inward toward the machine-frame and then up, so as to clear the alining-bars. The reverse movement of the jaw-piece 23 is downward and outward. In the old style of line-carriage the movable jaw used to swing into place and had to be made considerably smaller to clear the alining-bar. The required movements of the jaw 23 in the directions indicated are accomplished by the travel of its guide-pins 29, Fig. 11, in the guideways 30 of the plates 31 and 32, said guide-pins 29 being connected with links 38, Figs. 7 and 8, that in turn connect with a horizontally-movable slide 39, Figs. 7 and 9, which works in a dovetailed groove 40, Fig. 11, formed transversely in one of the guide-plates of said movable jaw. The slide 39 is provided at its outer end with an arm 41, Figs. 2, 7, 8, and 9, carrying a casing 42 for a spring 43, which bears at one end against the outer closed portion of said casing and at the other end against a fixed rod or stem 44, projecting into the open end of the casing. This stem 44 is fixed to and supported by a lug 45 on a lower tie-plate 46, Fig. 7, in which rest the vertical guide-plates 31 and 32 of the movable jaw 23, said plates being also held together by a tie-bar 47 at the top. It will be understood that the guide-plates 31 32 and accompanying parts are connected with the slide-block 34 of the movable carriage-jaw and that they are actuated therewith by means of the screw 37 in spreading and closing the carriage.

When the movable carriage-jaw 23 is moved inward and upward, as shown in Figs. 1, 6, and 7, by the pressure of a lever against the outer end of the slide 39, as hereinafter described, the said jaw part 23 will be automatically locked in its operative position at the end of a line of assembled matrices by means of a catch 48, Figs. 2, 8, and 9, that is snapped by a spring 49 across the outer end of said slide. This catch 48 and its spring 49 may be mounted on one of the slide-blocks of the movable carriage-jaw.

After the line-carriage has moved away from the casting-point and the matrix-bars and spacers have been lifted out and removed by suitable distributing mechanism, such as described and shown in the before-named patents, the carriage will continue to move toward the assembly-point, and in doing so a projection 50 on the upper end of the catch 48, Fig. 2, will strike against a pivoted tripping-dog 51, that is held from swinging by a stop 52 at its back. The dog 51 and stop 52 may be attached to the rail 16 or other fixed part of the machine. In thus coming against the dog 51 the catch 48 will be tripped, so as to release the slide 39 and permit it to be moved outward by the pressure of its spring 43, Fig. 9, thereby causing the movable carriage-jaw 23 to drop down and back out of the way before it gets to the newly-assembled line. After the movable jaw 23 has been again pushed into operative position at the end of a line of assembled matrices and as the carriage returns toward the casting-point the rounded edge of the catch projection 50 will pass easily under the beveled end of the tripping-dog 51, thereby lifting said dog against the action of a spring 53, that will return said dog to normal position after the catch has passed, the slide 39 and jaw 23 meanwhile remaining locked.

By reference to Figs. 6, 7, 9, and 12 it will be observed that the rod 36, which connects and braces the slide-blocks of the carriage-jaws, is provided at one end with a head-block 54, having therein a longitudinal slot 55, through which is passed a guide-pin 56, that is screwed into a portion of the slide-block 24, to which the fixed carriage-jaw 22 is secured. In this block 54 there is an opening 57 to be engaged by a vertically-movable bolt 58, which is mounted in a recessed portion 59 of the slide-block 24, that forms part of the fixed carriage-jaw. A spring 60, Fig. 12, normally presses the bolt 58 upward to engage the block 54, and thereby rigidly connect one end of the rod 36 with the fixed jaw of the carriage. On the screw-threaded end portion of the rod 36 there is a nut 61, Figs. 6 and 9, that bears against the outer side of the block 35, being held by a jam-nut 62, having a spring 63 bearing against its outer face. The upper end of the spring 63 is bifurcated or notched to straddle the rod 36 and permit any required adjustment of the carriage-jaws to differences in length of line to be assembled and justified. It will be noticed that the rod 36 and screw-shaft 37 are both longer than will be ordinarily necessary, so as to allow for adjustment of the carriage-jaws for different lengths of lines. This adjustment of the jaws 22 and 23 to differences in length of line required can be accomplished by forcing back the spring 63 and loosening the nuts 61 and 62, and then rotating the serew-shaft 37 in the proper direction by means of a suitable lever inserted into any one of a series of holes with which said screw-shaft is provided, as shown in Figs. 7 and 9.

When the carriage moves over to the casting-point and the line has been cast and the traveling alining-bar 15 is pulled back, as hereinafter described, the jaws 22 and 23 of the carriage will be spread simultaneously with the pulling of said alining-bar out of the line, so as to allow the matrix-bars and spacers to be depressed, as in the before-named patents, preparatory to their removal and distribution. This spreading of the carriage-jaws 22 and 23 is effected by means of a horizontally-movable slide-bar 64, Figs. 2, 5, and 6, worked from a crank-arm 65 on the auxiliary shaft 66, Fig. 5, which is described in the patents before named. The inclined projection 67, Fig. 5, on the slide 64 when moving in toward the machine-frame will lift the roller 68, attached to the vertically-movable slide 69, and thereby causes the upper end of said slide 69 to rock a dog or lever 70, Figs. 5 and 6, that is fulcrumed in a recessed portion of the fixed carriage-jaw and connected with the vertically-movable bolt 58, as shown in Fig. 12. By this upward movement of the slide 69, rocking the lever 70, Fig. 12, the bolt 58 is pulled out of its locking-recess in the block 54 on the end of the rod 36, and consequently the slide-blocks of the two carriage-jaws 22 and 23 are disconnected, leaving said jaws free to spread. On the vertically-movable slide 69 there is a bifurcated or slotted arm 71, Fig. 5, engaging a roller 72 on a crank-arm 73 of the screw-shaft 37, as shown in Figs. 5, 6, and 9. This screw-shaft 37 has a quick thread on it and will promptly spread the carriage-jaws 22 and 23 apart when the crank-arm 73 is pushed upward by the upward movement of the slide 69, as described. A guide-bracket 74 Figs. 5 and 6, furnishes a brace or support against a depending extension 24^a of the slide-block 24 to prevent any twisting or jamming of the carriage-jaw 22 and its said slide-block in the grooves of the guide-rails 16 and 17 when the horizontally-movable slide-bar 64 is pulled against the roller 68 of the vertically-movable slide-bar 69 in actuating the screw-shaft 37 to spread the jaws of the carriage. As shown, this guide-bracket 74 is adjacent to the lower end of the depending slide-block extension 24^a, Figs. 6 and 7, to which the slide 69 is conveniently attached. If desired, an antifriction-roller 75, Fig. 7, may be provided at the back of the slide 69, so that it will move easily.

After the carriage-jaws 22 and 23 are expanded or spread apart, as above described, the matrix-bars and interposed spaces will be depressed by means of mechanism such as shown and described in the before-named patents. Below the point where the line is pushed down by the depressing mechanism there is a fixed trough or shoe 76, Figs. 2, 4, and 5, that is designed to support the depressed matrix-bars and spacers. This shoe is extended from below the casting-point to the place where the matrix-bars and spacers are to be engaged by a distributing mechanism that forms no part of the present invention and which is therefore not illustrated, being fully shown and described in the before-named patents.

As the carriage moves toward the line-distributing point the roller 68, Fig. 5, drops off from the projection 67 of the slide-bar 64 and permits the vertically-movable slide 69 to be pulled down by a spring 77, Figs. 5, 6, and 7, thus actuating the screw-shaft 37 through its crank-arm 73 in the proper direction to close the jaws 22 and 23 onto the bars composing the depressed line and hold them together until ready to be distributed. The upper end of the spring 77 is attached to a lug 78 on the slide-bar 69, and its lower end is connected with the lower one of two guide-bolts 79, inserted through suitable guide-slots provided in said bar.

The slide-block 34 of the movable carriage-jaw 23 is attached to a standard 80, Figs. 2 and 6, on an auxiliary carriage 81, that forms a lower part of the line-carriage proper. This auxiliary carriage 81 is provided with suitable guides 82 and 83, Fig. 6, to travel along a lower slotted guide-rail 84, Figs. 2 to 6 and 6^a, in moving the line-carriage to and fro between the point where the line of matrices is assembled and the point where the type-high

printing-bar is to be cast. The connection between the slide-block 34 of the movable carriage-jaw 23 and the standard 80 of the lower auxiliary carriage 81 may be by a tongue-and-groove joint 85, as indicated in Figs. 6 and 7, so that the said parts can be easily connected and disconnected; but in operation they are held together by the guide-rails along which they travel.

On the auxiliary carriage 81 there is attached a bracket 86, having a vertical arm 87, Figs. 2 and 6, to which one end of a lever 88 is fulcrumed. The other end of said lever 88 is curved downward and formed with a lifter 89, Fig. 6, and a roller 90 is mounted on said lever intermediate its ends. Now as the carriage nears the distributing mechanism in its travel from the casting-point the roller 90 will strike the bevel of a lifting-dog 91, Figs. 2 and 6, and will ride up on said dog, so as to cause the lever 88 to rise and carry its lifter 89 up against the under side of the roller 68, Fig. 6, on the vertically-movable slide 69, thereby releasing the carriage-jaws 22 23 and actuating the screw-shaft 37, so as to spread the jaws apart and allow the matrix-bars and spacers to be lifted out of the carriage by the distributing devices. The bracket 86 is attached to the auxiliary carriage 81 by slot-and-bolt connections 92, Fig. 2, or other adjusting means, so that the position of the lever 88 and its roller 90 can be varied to suit the length of the line. In a similar manner the lifting-dog 91 is adjustable in the horizontal slot 93 of a bracket 94, Figs. 2 and 6, that is secured to the rail 17, and thus this dog 91 can be readily moved to any required position with reference to the length of the line.

The auxiliary carriage 81 and the lower rail 84 are longitudinally slotted for passage of a line-carriage lever (indicated by broken lines at 95, Fig. 5) which bears between rollers 96, Fig. 6, on the inner side of the auxiliary carriage. The mechanism for actuating this lever to operate the line-carriage may be similar to that described in the before-named patents. This improved line-carriage, constructed and arranged in the manner described, is thereby better adapted to heavy work, as in the casting of lines of great length and for a large type, without subjecting the carriage to strain.

Control of the traveling alining-bar.—The traveling alining-bar 15 stands back from the matrix-bars and spacers while the line of matrices is being assembled and until the machine is started. The starting mechanism is connected with a lever 97, Figs. 1 and 2, on the hub of which is an arm 98, that connects by a link 99 to the clutch-dog, as in the former style of machine. The lever 97 is provided with a projection 100, Fig. 3, to close the movable carriage-jaw 23 by pushing in the slide 39, through which said jaw is actuated.

At or near its upper end the lever 97 is provided with a projection 101, Figs. 1 and 3, to throw the traveling alining-bar 15 into engagement with the assembled matrix-bars 1 and spacers 6, as indicated in Figs. 15 and 16. This lever projection 101 does not, however, come into direct contact with the traveling alining-bar 15, but strikes one of several fingers or slides 102, Figs. 1, 2, and 3, that are connected at one end by a rod 103, which is in turn connected by levers 104 to a lower shaft 105, mounted in suitable bearings on the guide-rail 16, Figs. 2 and 3, or other fixed part. In one of these slides or fingers 102 there is a notch, into which snaps a catch 106, Fig. 1, when the said slides are thrown in, thus holding the traveling alining-bar 15 into engagement with the line of matrices. This catch 106 is not released until the alining-bar 15 comes back from the casting-point with the line-carriage. At this time the alining-bar 15, having been previously pulled back by mechanism hereinafter described, will consequently strike a small lever 107, Fig. 1, and thereby withdraw the catch 106, so as to allow the fingers 102 to come back under the tension of a spring 108, Figs. 1 and 2, that is connected with the shaft 105 for this purpose.

When the traveling alining-bar 15 is thrown into engagement with the line of matrices by the lever 97 and slides or fingers 102, the notched projection or arm 20 on said alining-bar will become interlocked with the fixed jaw 22, Figs. 6 and 7, of the line-carriage, as hereinbefore explained.

The traveling alining-bar 15 and the movable carriage-jaw 23 having been thrown in by the lever 97, as already described, and the machine started up, the said alining-bar 15 travels with the carriage and with the matrix-bars and spacers to the justifying-point and subsequently to the casting-point after the line of matrices has been justified by the aid of devices hereinafter described.

To prevent the traveling alining-bar 15 from working out of engagement with the matrix-bars and spacers during the travel of the line-carriage, there is provided above the rail 16 a guide device 109 109^a, Figs. 1 and 2, that is preferably constructed of separable parts or bars, as shown in Figs. 4 and 14. In the under side of the connected guide-bars 109 109^a there are provided two parallel longitudinally-extended guide-grooves 110 111, that are respectively arranged to receive the guide-lugs 19 of the alining-bar 15 in its travel to and from the casting-point. On passing from the justifying-point the guide-lugs 19 of the traveling alining-bar 15 follow each other into and through the guide-groove 110, Fig. 14, of the bar 109 and thence into the correspondingly-alined groove 110 of the part or bar 109^a, Figs. 4 and 14. The parallel grooves 110 111 of the bar 109 extend only part way the length of said bar or to a point where it overlaps the adjacent end portion of the grooved bar 109^a, one side of which rests

along its end portion against a shoulder 112, Fig. 14, that is extended along the ungrooved portion of the bar 109, the under side of said shoulder 112 forming the top of a continuation of the groove 111, the sides of which are formed by adjacent portions of the bars 109 and 109ª, as shown in Fig. 4.

In traveling with the line-carriage to the casting-point the alining-bar 15 is supported on and slides along the top of the guide-rail 16 and the guide-lugs 19 follow each other in the groove 110, thereby holding said alining-bar in supporting engagement with the line of matrices, and thus as the matrix-bars and spacers travel with this alining-bar their engaging notches or lugs are not subjected to any wear that would be liable to distort an assembled line.

After a cast of the required type-high printing-bar has been made from the line of matrices the alining-bar 15 will be pulled back from the matrix-bars and spacers by beveled pins 113, Figs. 5 and 6, descending through guide-openings 114, Fig. 1, in the anvil 115 and engaging in the beveled slots 18 of said alining-bar. In this retracting movement of the alining-bar 15 away from the line of matrices the lugs 19 on said alining-bar pass through openings 116, Figs. 2 and 14, into a passage 117, Fig. 5, at the outer side of the guide-bar 109ª, which is in line with the guide-groove 111 of the bar 109, as indicated in Figs. 1, 4, and 5. After retracting the alining-bar 15 the pins 113 will rise immediately to allow the said alining-bar to come out with the line-carriage. The pins 113 depend from a cross-head 118, Figs. 5 and 6, on an arm 119, carried by the upper end of a vertically-movable rod 120, the lower end of which is secured to a vertically-movable slide 121, Figs. 2 and 5, that works in a guide 122 on a bracket 123, depending from the rail 17 or a fixed part of the machine-frame. The vertically-movable slide 121 and guide-bracket 123 are both vertically slotted for passage of the horizontally-movable slide 64, Fig. 5, that is actuated from the crank-arm 65 of the auxiliary shaft 66, as before explained. In the slotted bracket 123 there is a guide-roller 124, engaging a horizontal slot 125, Fig. 5, in the slide 64 to assist in supporting the same. A roller 126 is mounted in the slot of the vertically-movable slide 121 adjacent to a beveled projection 127 on the under edge of the horizontally-movable slide 64, so that when the said projection 127 is drawn in toward the frame of the machine by movement of the auxiliary shaft 66 the vertical slide 121 will be drawn down and cause the pins 113 to descend and pull back the traveling alining-bar 15, thereby releasing the line of matrices. At the same time the inward movement of the horizontal slide 64 lifts the vertical slide 69, Figs. 5 and 6, and thereby unlocks and opens the jaws 22 and 23 of the line-carriage, as before described. The inward movement of the horizontal slide 64, pushing up the slide 69 and pulling down the slide 121, thus effects what may be termed the "first line-release," leaving the line of matrices entirely free to be depressed or pushed down onto the before-mentioned shoe 76 by the action of a depressor 128, Fig. 2, that forms, however, no part of this invention. As soon as the projection 127 of the slide 64 passes the roller 126 of the slide 121 a spring 129, Figs. 5 and 6, on the rod 120 will cause the pins 113 to rise from engagement with the traveling alining-bar 15, so that it can return with the carriage. The spring-catch 28 on the carriage-jaw 22, Figs. 6, 7, and 9, will readily yield to permit pulling back of the alining-bar 15 by the descending pins 113; but in this movement of said alining-bar its arm or projection 20, Figs. 7 and 10, is not wholly disengaged from the slot 27 of the carriage-jaw. Consequently the said traveling alining-bar 15 will return with the line-carriage to the assembling-point. In returning to the assembling-point the guide-lugs 19 of the traveling alining-bar 15 pass from the passage 117, Fig. 5, at the side of the guide-bar 109ª into the guide-groove 111, Figs. 4, 6, and 14, of the guide-bar 109, and it will thus be obvious that by means of these guide devices the alining-bar 15 will remain retracted until it arrives in position to be engaged with another line of assembled matrices.

It has been already explained that as the line-carriage moves toward the distributing-point the roller 68, Figs. 5, 6, and 7, drops off from the projection 67 of the horizontal slide 64, and thus permits the vertical slide 69 to be pulled down by the spring 77, so as to close and lock the carriage-jaws 22 and 23 onto the depressed matrix-bars and spacers to hold them together while being carried to the distributer. I have also hereinbefore described how the roller 90, Figs. 2 and 6, rides up on the dog 91 and thereby actuates the lever 88 to lift the slide 69 and again open the jaws 22 and 23 as the line-carriage approaches the distributing-point. This may be termed the "second line-release," as in the before-named patents. As the line-carriage moves to the assembling-point the retracted alining-bar 15 touches the lever 107, Fig. 1, thereby withdrawing the catch 106, permitting the spring 108 to rock the shaft 105 and pull back the fingers 102, Figs. 1 and 3, so the said traveling alining-bar 15 can pass into position to be engaged with a newly-assembled line of matrices. Immediately after the tripping of the catch-lever 107 by the alining-bar 15 the catch 48, Fig. 2, will be tripped by striking against the dog 51, thus releasing the slide 39 and permitting the movable carriage-jaw 23 to drop down and back, as shown in Figs. 8 and 9, so as to readily pass along the newly-assembled line to the position where said movable jaw is to be engaged with the end of said line by inward

movement of the lever 97, as before explained, the traveling alining-bar 15 being also at the same time engaged with the line.

Between the assembling-point and the casting-point the line of matrices travels in a space or raceway 130, Figs. 3 and 4, that is provided by a shield 131 on one side and by the rail 16 and guide-bars 109 109^a on the other. As shown in Figs. 6 and 14, the guide-bar 109^a is provided next to the raceway 130 with a longitudinal rib or flange 132, that is extended the whole length of the lower edge of said bar. It also has on its upper edge a similar rib or flange 133, that is extended only along the adjacent portion of the anvil 115, to the under side of which this bar 109^a is secured. These ribs or flanges 132 and 133 provide between them a longitudinally-extended groove 134, Fig. 14, to accommodate the lugs 9 of the space-bars 6, Fig. 16, and the upper rib or flange 133 is shortened, so as to permit these space-bars being lifted out by the distributing mechanism.

Justifier.—The justifying mechanism *per se* by which the space-bars are operated to expand the line to exact length comprises a vertically-movable shoe 135, Fig. 2, that is constructed and operated substantially the same as in the before-named patents. As the carriage, with the assembled line which it holds, moves along the raceway toward the casting-point it dwells at the justifier long enough to permit justification to be accomplished. At this point and above the rail 16 and fixed alining-bar 14 there is provided a grooved or recessed block 136, Figs. 1, 2, 3, 6^a, 13, 15, and 16, having along one edge a flange or rib 137 to engage the jog 10 in the lug 9 of each space-bar 6, as shown in Fig. 16, and thus provide a suitable support for the space-bars in an assembling line until the traveling alining-bar 15 is moved into engagement with the notches of the matrix-bars 1 and beneath the lugs 9 of the space-bars. This longitudinal flange or rib 137 extends at one end toward the assembly-box, as shown in Figs. 1, 2, 6^a, and 13. On the block 136 there is a cap 138, having a depending flange 139, beneath which will come the lugs 9 of the space-bars when the line is assembled. This flange 139 affords a bearing for the space-bar lugs 9 when the lower sections 7 of the space-bars are forced upward by the justifying-shoe 135 in expanding the line to a correct length and to wedge or tighten the several bars of which the line is composed. The cap 138 is provided with a number of diagonal slots 140, Fig. 13, for passage of bolts 141, Figs. 1, 2, and 6^a, that hold down said cap and yet allow it to be drawn back, so that a space-bar can be taken out and replaced by one of different thickness, if necessary. For this purpose the cap is provided with a handle 142, by which it can be moved. The cap 138 is provided also with a locking-pin 143, Fig. 3, attached to a spring 144 to hold said cap in the position to which it may be adjusted.

In the block 136 there is a longitudinal groove 145, Figs. 3 and 6^a, for accommodation of the guide-lugs 19 on the traveling alining-bar 15, and it has transverse grooves 146, Fig. 13, for the fingers 102, that push out the said alining-bar, and also a groove 147 for the catch 106, that locks said fingers, as before described. The longitudinally-extended groove 145 is in line with the guide-grooves 110 and 111 of the bar 109, one end of which has a flange 148, Figs. 2 and 14, that is bolted down onto the block 136, the other end being supported on the bar 109^a, as indicated in Figs. 2, 6, and 14. A handle 149 is provided on the bar 109, so that on detaching it from the block 136 it can be lifted out, if necessary, for any purpose. When in place, it may be held down by a gravity-dog 150, Fig. 6, or otherwise.

Assembly-box and assembling mechanism.—The matrix-bars are delivered from their appropriate magazine compartments or cells into an assembly-box 151, Figs. 2 and 17 to 20, by the successive operation of matrix-keys, as described in the before-named patents. In the present improvement, however, the assembly-box throat 152, Figs. 1 and 18, between the wings or gates 153 and 154, occupies a central position below and with relation to the width of the delivery portion of the magazine 155, Fig. 2, so that the centrally-stored matrix-bars, which are the thin ones and mostly used, will come down perfectly straight onto their respective stop-bars 156, Fig. 2, while those matrix-bars at the right and left will have an equal inclination in their descent, and the bars at the extreme right will not have to travel so far as before, where the throat 152 was more to the left, as in the former construction; but the central location of the throat 152 necessitates more travel for the plunger 157, Fig. 18, in assembling the matrix-bars on the fixed alining-bar. This plunger 157 is actuated through a bell-crank lever 158, Figs. 1 and 18, one arm of which is arranged to oscillate between bearings 159 and 160 on the under side of the plunger. In the bearing 160, which forms part of the head of the plunger, there is mounted a longitudinally-movable pin 161, having a spring 162 thereon. The matrix-bar would be liable to turn if it were not for this longitudinally-movable pin 161, which comes out and enters one of the holes 5 of the matrix-bar 1, Fig. 15, before the plunger or pusher 157 starts forward and before the gates 153 and 154 open. Thus the matrix-bars are prevented from turning and also from slipping down or off from the stop-bars 156 when the gates of the assembly-box are opened to permit the passage of said matrix-bars onto the tongue 14^a of the alining-bar. By reference to Fig. 18 it will be understood that the lever 158 first pushes the longitudinally-movable pin 161 into one of the holes 5 of a matrix-bar that has descended onto its appropriate stop-bar and next forces the plunger 157 forward, thereby wedging open

the gates 153 154 and carrying the matrix-bar onto the alining-bar. As the plunger returns the pin 161 is retracted by its spring 162 in readiness for further operation on the succeeding matrix-bar or space-bar, the latter being steadied in like manner by engagement of the pin 161 in the hole 12, Fig. 16, while the spacer is transferred to the rib 137, Figs. 1 to 4. It will be observed by reference to Figs. 2 and 17 that the outside gate 153 is cut off level with the top of the guide-rail 16, while the inside gate 154 is extended to the bottom of the assembly-box, as shown in Figs. 17 to 20. This is the reverse of the old style of assembly-box. With this exception the construction of the gates 153 and 154 is the same as described in the before-named patents, and they are operated in the same manner.

The link 163, Fig. 1, through which the bell-crank lever 158 is actuated from the oscillator, described in Patent No. 605,141, has a yielding connection 164 with said lever, so that should a matrix-bar stick or catch in the assembly-box the oscillator can make its full stroke without risk of injury to the assembling mechanism or to a matrix-bar contained in the box. It will be understood, however, that this yielding connection 164 should have sufficient stiffness or tension to insure a proper opening of the gates 153 154 by the forward movement of the plunger 157 in the ordinary running of the machine.

What I claim as my invention is—

1. In a line-casting or monoline composing-machine, a series of matrix-bars each having a group of matrices on one edge and each provided on its other edge with a series of alining-notches exceeding the number of said matrices, whereby any matrix-bar that may have to be brought to its lowest operative level, to present a required character at the proper point in an assembled line of matrices, is adapted to be engaged both with a stationary assembly alining-bar and with a traveling alining-bar operated in a horizontal plane above the said stationary alining-bar, substantially as described.

2. A matrix-bar provided with a vertical series of perforations and having a series of alining-notches on one edge, in combination with an alining-bar, a plunger or pusher to move the matrix-bar onto the alining-bar, and a longitudinally-movable pin to engage in one of the said perforations of the matrix-bar and prevent it from turning or slipping while being moved onto the alining-bar, substantially as described.

3. A matrix-bar provided with a vertical series of perforations and having on one edge a corresponding group of matrices and on its other edge a series of alining-notches exceeding the number of said matrices, substantially as described.

4. An expansible spacer-bar composed of upper and lower sections and having on the upper section a supporting-lug 9 with a jog or recess 10 in the lower corner of said lug, whereby the said spacer-bar may be first engaged, at said lug-recess with a stationary support and subsequently with a traveling alining-bar movable below said support and lug, substantially as described.

5. An expansible spacer-bar comprising upper and lower sections having, in one section, a perforation and in the other a corresponding slot, in combination with a longitudinally-movable pin to engage said perforation and slot so as to prevent turning or slipping of the said spacer-bar while being moved into position in assembling a line of matrices, substantially as described.

6. The combination with a line-carriage, and a stationary alining-bar on which to assemble a line of matrix-bars, of a traveling alining-bar movable to and from said line and adapted to engage therewith and to move with the line-carriage, substantially as described.

7. The combination with a line-carriage, and a stationary alining-bar on which to assemble a line of matrix-bars, of a traveling alining-bar movable to and from said line in a horizontal plane above the said stationary alining-bar, to engage and move with the line and support the same as it moves with the line-carriage, substantially as described.

8. The combination with a line-carriage, and a stationary alining-bar on which to assemble a line of matrices comprising a series of matrix-bars that each have on one edge a group of matrices and on the other edge a series of alining-notches exceeding the number of said matrices in each group, of a traveling alining-bar movable to and from said line in a horizontal plane above the said stationary alining-bar to engage and move with the line and whereby the said traveling alining-bar will engage with any matrix-bar that may have to be brought to its lowest operative level to present a required character at the proper point in an assembled line, substantially as described.

9. The combination with a line-carriage, a series of matrix-bars and interposed spacers, and a stationary alining-bar, of a traveling alining-bar carried by the line-carriage and movable to and from the line of assembled matrix-bars and spacers to engage with and support the line as it moves with said carriage, substantially as described.

10. The combination with a carriage for moving an assembled line in a monoline composing-machine, of a traveling alining-bar adapted and arranged to move with said carriage and independently movable to and from the assembled line to engage with and be released from the same, substantially as described.

11. The combination with a carriage for moving an assembled line in a monoline composing-machine, of a traveling alining-bar adapted to have a yielding connection with said carriage to move with the same and independently movable to and from the assembled line, substantially as described.

12. The combination with a carriage for moving an assembled line in a monoline composing-machine, of a traveling alining-bar carried by said line-carriage and independently movable to and from the assembled line, and mechanism for controlling said traveling alining-bar, substantially as described.

13. The combination with a traveling line-carriage, and a traveling alining-bar adapted and arranged to move with said carriage and be independently movable to and from an assembled line in a monoline composing-machine, of a yielding device for connecting said bar and carriage, substantially as described.

14. The combination with the carriage-jaws, and a screw-shaft for moving said jaws toward and from each other, of a rod for bracing and detachably connecting said jaws and on which said jaws are adjustable to the length of an assembled line of matrix-bars and spacers, substantially as described.

15. The combination with the carriage-jaws, and a screw-shaft for moving said jaws toward and from each other, of a connecting and bracing rod having a locking and unlocking engagement with one of said jaws and on which the said jaws are adjustable to the length of line required, substantially as described.

16. The combination with the carriage-jaws, means for moving said jaws toward and from each other, and a traveling alining-bar movable with the carriage-jaws, of a connecting and bracing rod having a locking and unlocking engagement with one of said jaws and on which the said jaws are adjustable to the length of line required, substantially as described.

17. The combination with the movable carriage-jaw and its guide-pins, of guide-plates having guideways to receive said pins, a horizontally-movable slide, links connecting said slide and pins, a spring to act on said slide for causing the said jaw to move downward and outward from one end of a line of matrices held in a line-carriage, a catch for locking said slide when the movable jaw is carried inward and upward, and means for tripping said catch, substantially as described.

18. The combination with the carriage-jaws, and a screw-shaft for moving said jaws toward and from each other, of a rod connecting said jaws, a spring-pressed bolt mounted in one of said jaws to engage a head on one end of said rod, a pivoted tripping-dog connected with said bolt, a vertically-movable slide to trip said dog, a crank-arm on the screw-shaft and connected with said slide, and means for actuating said slide to release and spread the carriage-jaws, substantially as described.

19. The combination with the carriage-jaws, means for moving said jaws toward and from each other, and a traveling alining-bar movable with the carriage and provided with slots that are beveled at one end, of vertically-movable beveled pins to engage in said slots and move the said alining-bar away from the line of matrices, and mechanism through which said pins are actuated, substantially as described.

20. The combination with the carriage-jaws, and a screw-shaft for moving said jaws toward and from each other, of a vertically-movable slide connected with a crank on said screw-shaft, a lifting-lever to engage and lift said slide, a roller on said lever, and a lifting-dog for said roller to ride on, substantially as described.

21. The combination with a line-carriage and its jaws, of a traveling alining-bar carried by said carriage and independently movable to and from a line of matrices arranged to travel with said carriage and bar, guides for the traveling alining-bar and carriage, mechanism for moving the traveling alining-bar into engagement with an assembled line and for closing a movable jaw of the carriage at one end of said line, and mechanism for spreading the carriage-jaws and moving the traveling alining-bar from engagement with the line of matrices after the casting of a type-bar, substantially as described.

22. The combination with the line-carriage, a traveling alining-bar to move with said carriage and independently movable to and from an assembled line of matrices, and guides for said carriage and traveling bar, of fingers for moving the said alining-bar into engagement with the line of matrices, a trip-catch for locking said fingers, and a spring for retracting the fingers, substantially as described.

23. The combination with the line-carriage, a stationary alining-bar, an assembled series or line of matrix-bars and spacers, and a traveling alining-bar movable to and from the line, of a block provided with a rib to furnish a support for the lugs on the spacers, a cap-piece movable on said block and provided with a depending flange to furnish a bearing for the said lugs on the spacers, and a shoe to act on the spacer-bars, against said cap-flange, and expand or justify the line, substantially as described.

24. The combination with the assembly-box and its gates, and a plunger to push matrix-bars out of the assembly-box, of a longitudinally-movable pin carried by said plunger and adapted to engage one of a series of perforations in a matrix-bar, substantially as described.

25. The combination with the assembly-box and its gates, a plunger to push matrix-bars out of the assembly-box, a longitudinally-movable pin carried by the plunger, and a lever to actuate said plunger, of a yielding connection between said lever and its driving mechanism, substantially as described.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

WILLIAM ERNEST BERTRAM.

Witnesses:
H. ADOLPH WINKOPP,
CLEMENT HOMURNICKELL.