No. 678,310. Patented July 9, 1901.

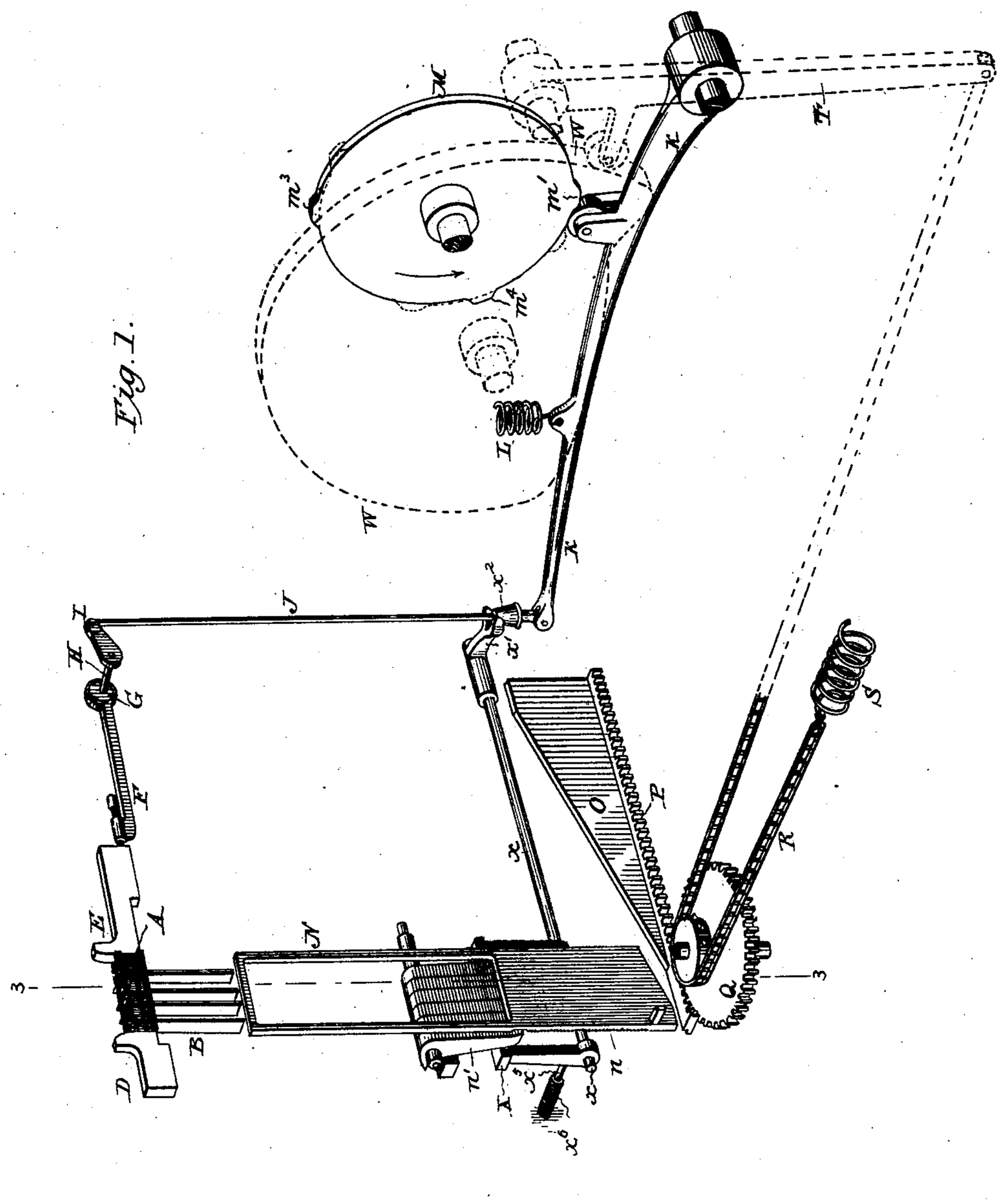
F. A. VINTON.

LINOTYPE MACHINE.

(Application filed July 2, 1900.)

(No Model.) 4 Sheets—Sheet 1.

Fig. 1.



Witnesses
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LINOTYPE MACHINE.

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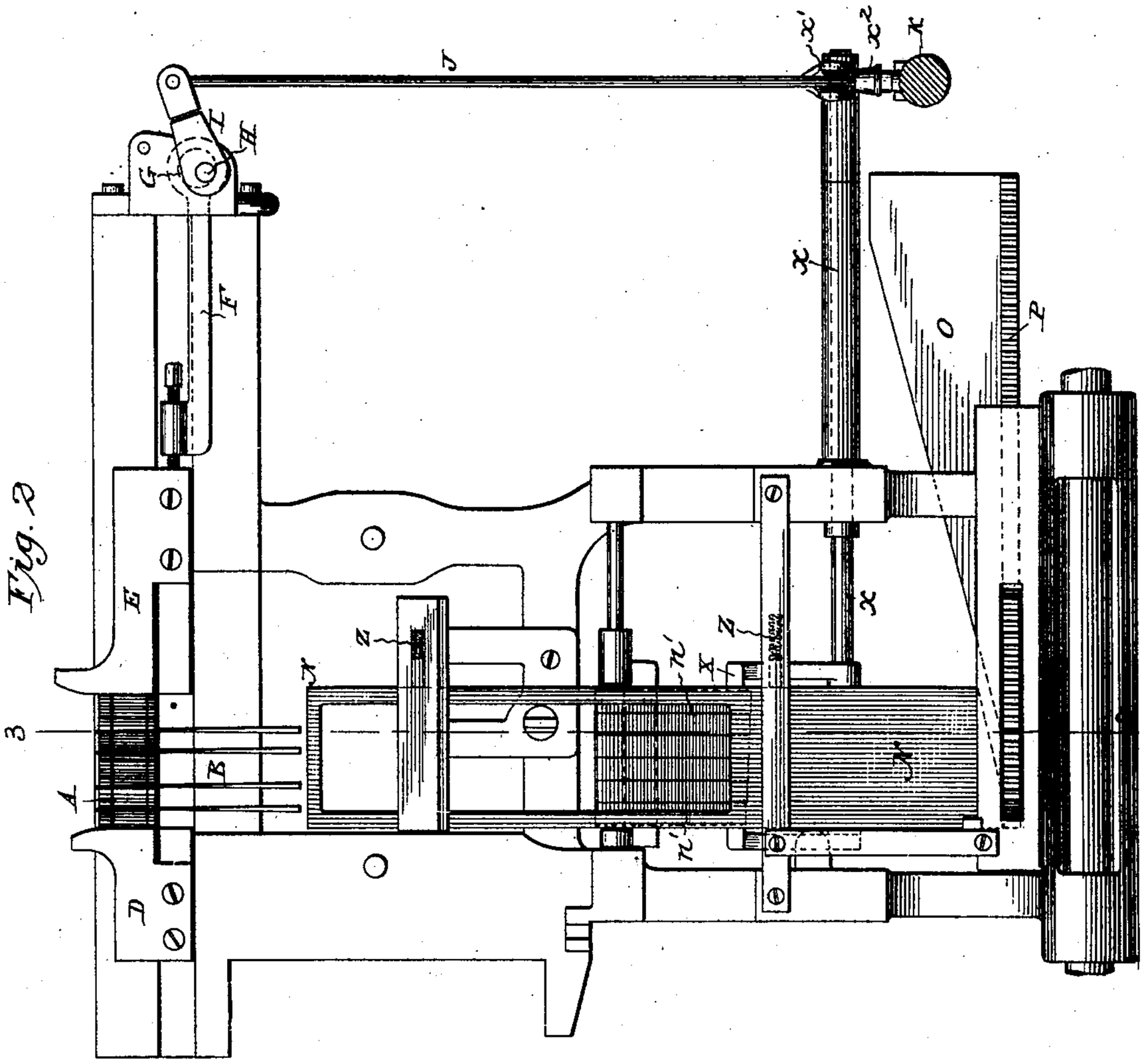
(No Model.) 4 Sheets—Sheet 2.

Fig. 2.



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(No Model.) 4 Sheets—Sheet 3.

Fig. 3.

ON LINE 3-3

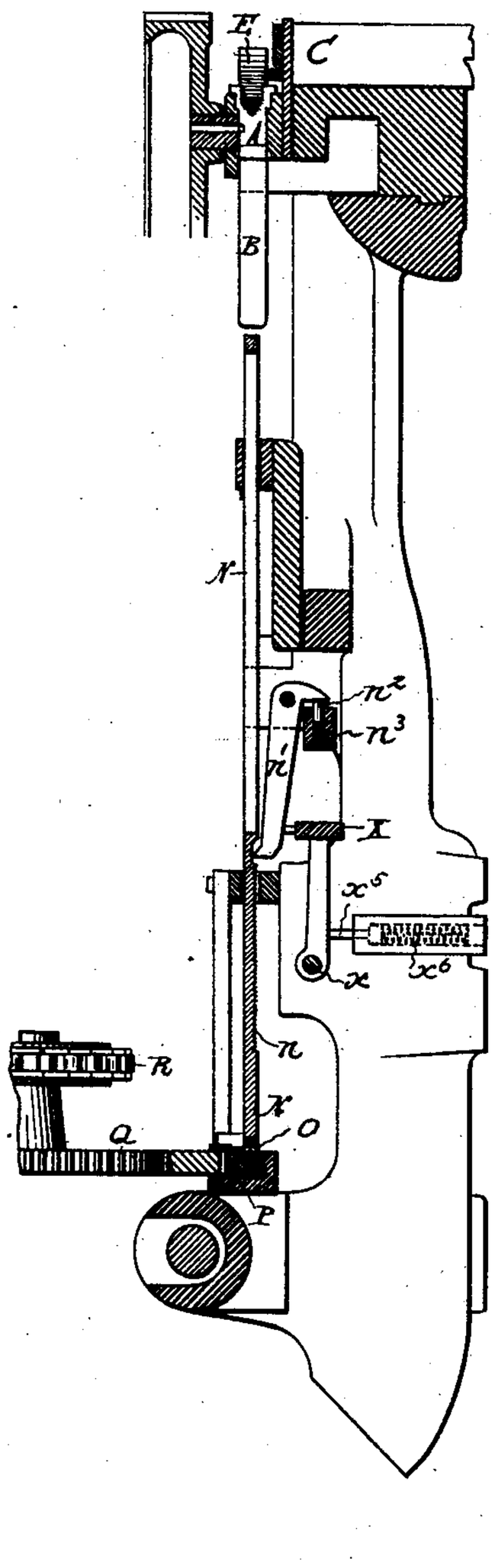


Fig. 4.

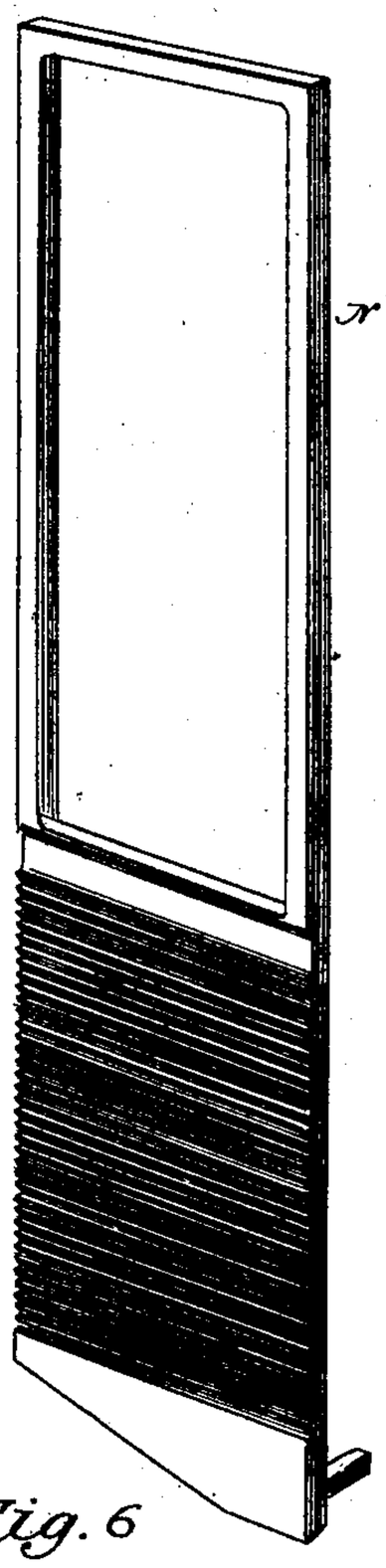


Fig. 6

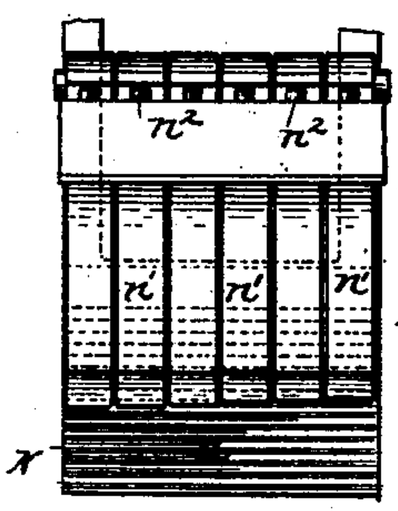
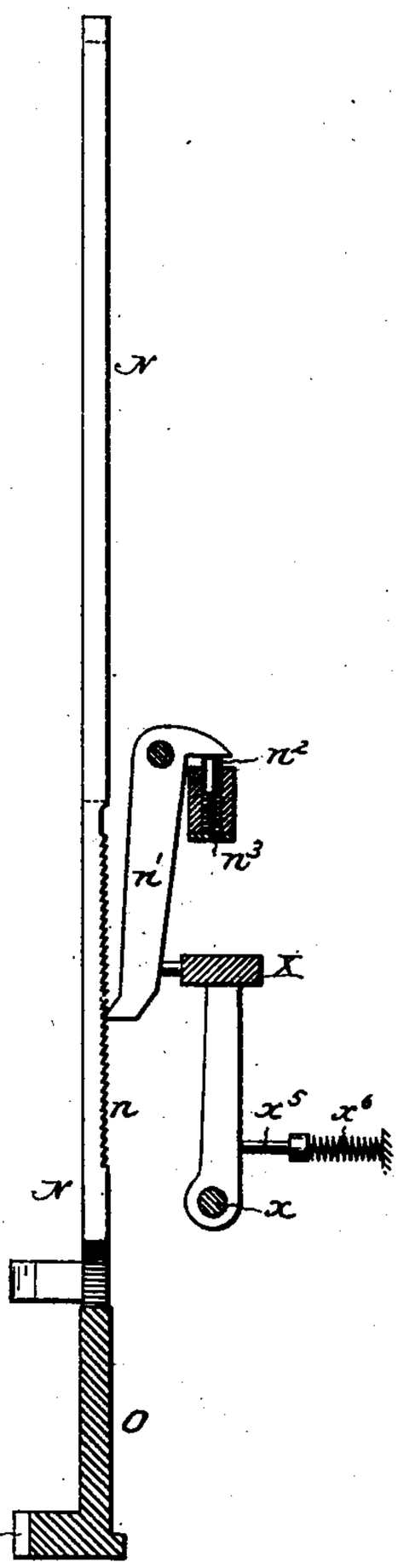


Fig. 5



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(No Model.) 4 Sheets—Sheet 4.

Fig. 7.

Fig. 11.

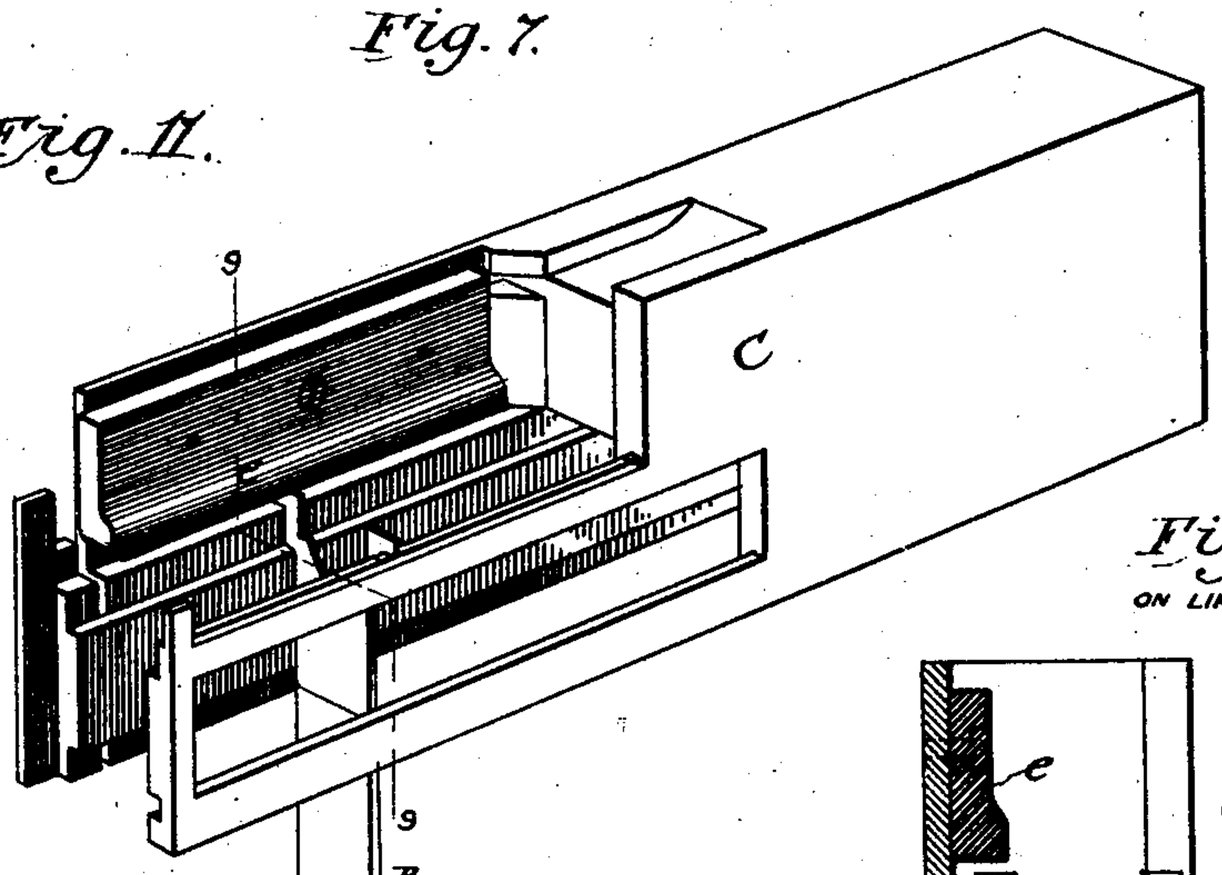


Fig. 9.

ON LINE 9—9

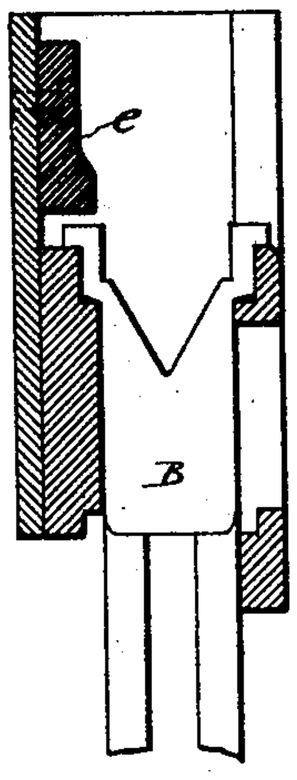


Fig. 10.

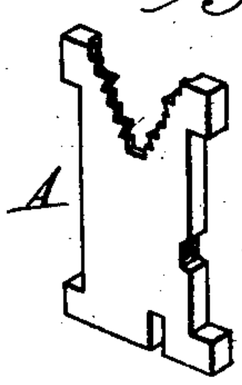
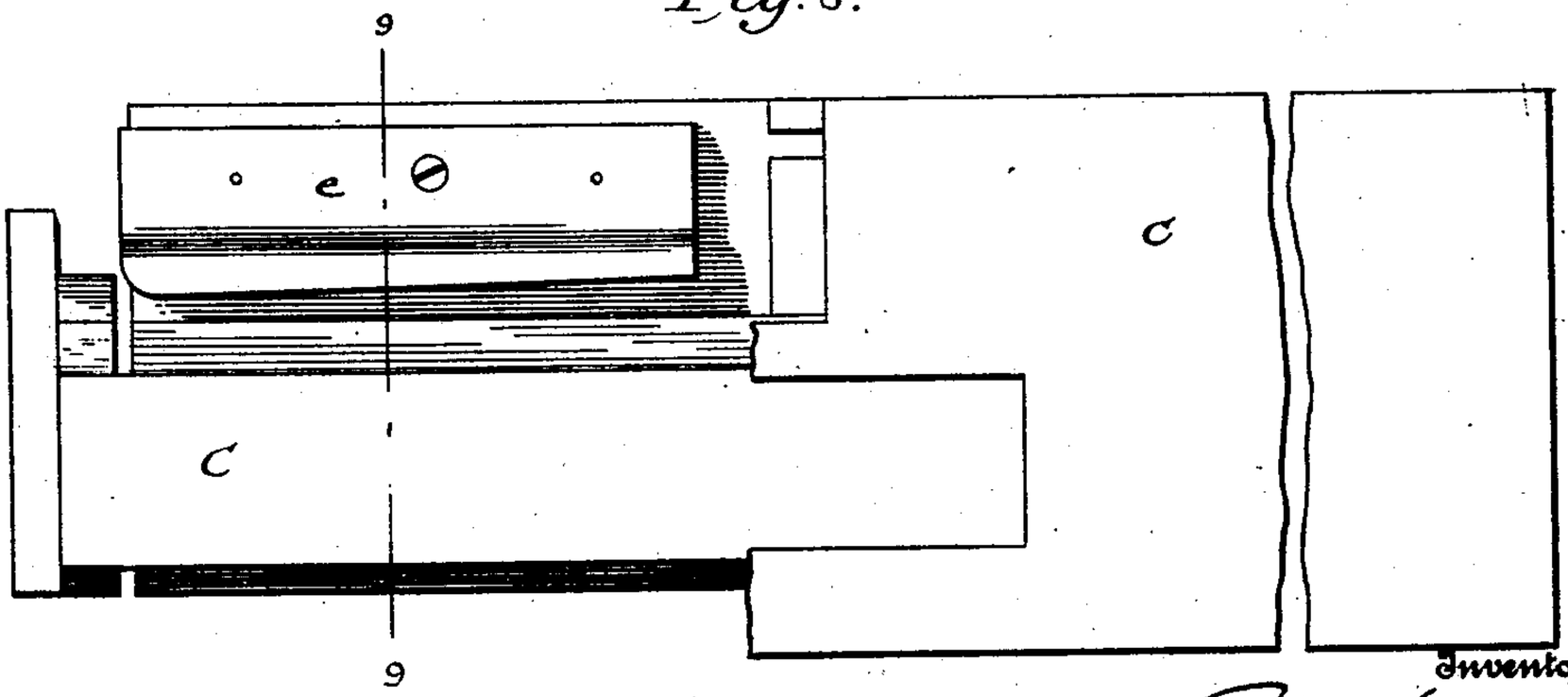


Fig. 8.



Witnesses

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Inventor

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UNITED STATES PATENT OFFICE.

FRANK A. VINTON, OF BALTIMORE, MARYLAND, ASSIGNOR TO THE MERGENTHALER LINOTYPE CO., OF NEW YORK.

LINOTYPE-MACHINE.

SPECIFICATION forming part of Letters Patent No. 678,310, dated July 9, 1901.

Application filed July 2, 1900. Serial No. 22,350. (No model.)

To all whom it may concern:

Be it known that I, FRANK A. VINTON, of Baltimore, in the State of Maryland, have invented a new and useful Improvement in Linotype-Machines, of which the following is a specification.

My invention relates to improvements in that class of mechanisms in which wedge spacers inserted in a composed line of matrices or dies are moved endwise through the line in order to elongate the latter to the predetermined length, or, as it is technically known, to effect "justification" of the line. These mechanisms are of two classes, first, those in which solid spacers increasing in thickness step by step are used, and, second, those in which each space consists of two smooth oppositely-tapered wedges connected by a sliding joint, so that when one of the wedges is held in the line and the other moved past it the effect is to increase the thickness of the space within the line. It is to this second class of spacers that my invention relates, and the object is principally to effect the perfect justification of the line without subjecting the parts to the severe strains heretofore required and without endangering the integrity of the walls of the matrices or dies.

Heretofore it has been the custom in the use of the double wedge spacers to seat the composed line between two jaws or abutments, held for the time being at a distance apart equal to the length of the required line, and to force the wedges through the line between the matrices until they have expanded the line to the required length and crowded the matrices solidly against each other. The frictional resistance against the sides of the spacers is great, and when the line is a long one, containing a large number of spacers, the aggregate resistance is such that powerful and objectionable pressure must be applied in order to insure the forcing of all the wedges through the line to the extent necessary to secure perfect justification and absolutely close joints between the adjacent matrices. I overcome this difficulty by separating the jaws or abutments primarily to an extent slightly greater than the length of the required line. This permits the spacers to advance through the line far enough to effect final justification without encountering any material resistance. In other words, it permits the spacers to be forced through the line far enough to effect justification by a gentle pressure. After they have been thus advanced the jaws or abutments are approximated and the line compressed endwise to the predetermined length. In practice it is found that owing to the great number of joints in the line between the matrices the composed line possesses an appreciable elasticity, so that the jaws may be safely separated a distance which will permit the easy entrance of the wedges without offering an excessive resistance to the compression required to bring the line back to the proper length.

In the drawings I have represented my invention as embodied in a Mergenthaler linotype-machine of the general organization represented in United States Letters Patent No. 565,490, the stepped spacers of that patent being replaced by wedge spacers and the details being modified as demanded by the change of spacers and by the nature of my invention. In all other respects the machine may be of ordinary construction.

Figure 1 is a perspective view illustrating in detail the essential parts of my justifying mechanism. Fig. 2 is a rear face view of the mechanism looking toward the front of the machine. Fig. 3 is a cross-section on the correspondingly-numbered line of Figs. 1 and 2. Fig. 4 is a perspective view of the slide for advancing the spacers through the line. Fig. 5 is a vertical cross-section from front to rear through said slide and its controlling-dogs. Fig. 6 is a front view of the justifying-slide and the series of dogs for controlling its advance. Fig. 7 is a perspective view of the first elevator by which the line of matrices and spacers is presented to and sustained in front of the mold during the casting operation. Fig. 8 is a view of the same, looking from the rear side, with portions broken away to expose the front wall. Fig. 9 is a vertical cross-section on the correspondingly-numbered lines of Figs. 7 and 8. Figs. 10 and 11 are views showing one of the matrices and one of the wedge spacers.

The matrices A and spacers B are of the or-

dinary construction used in the Mergenthaler linotype-machine of the present day and illustrated, among other places, in Letters Patent No. 436,532. The composed or assembled line of matrices containing characters for one line of print and the appropriate spacers between the words are transferred, as usual, into a vertically-movable elevator C, by which the line is lowered into position between two jaws or abutments D and E, by which the length of the line is determined. The jaw D is normally fixed in position. The jaw E is mounted to slide backward from its companion, its position being determined by a screw in the end of an arm F, mounted on an eccentric G, carried by a horizontal rock-shaft H. This shaft is mounted in bearings in the main frame and provided with a crank-arm I, connected by rod J to one end of lever K, pivoted at one end in the main frame. This lever is urged constantly upward by a spring L, connected thereto, and is depressed to a greater or less extent at suitable intervals by a cam-wheel M, which acts on a roller on the lever, as shown in Fig. 1. When the cam permits the lever to rise, the eccentric G and its connections move the jaw E inward toward its companion, thus reducing the distance between them and limiting the expansion or elongation of the matrix-line accordingly, as hereinafter more fully explained.

Below the position occupied by the spacers in the line is mounted a vertically-movable slide N, termed the "justifying-slide," the lower end of which overlies a horizontal slide O, having an inclined upper edge to act beneath the slide N, so that when the slide O is advanced to the left it will lift the pressure-slide N, which will in turn crowd the series of spacers upward through the matrix-line to effect its elongation. The advance of the wedge-shaped lifting-slide O may be effected by any suitable means; but I prefer to provide it with a longitudinal rack P, engaged by a horizontal gear-wheel Q, having a toothed hub acted upon by a sprocket-chain R. One end of this chain is connected to a spring S, which tends to advance the slide O, and thereby effect the forcing of the wedges upward with a spring-pressure. The opposite end of the chain is connected with a lever T, acted upon by a cam W, which serves, through the intermediate connections, to retract slide O in order that the justifying-slide may descend. The justifying-slide is provided across its forward face with a series of ratchet-teeth n, and in front of the slide there is mounted a series of depending pawls n', designed to engage the teeth and arrest the ascent of the slide while the latter is still subject to the lifting influence of the wedge or slide O, as hereinafter more fully explained, the pawls being made of slightly differing length in order that when they are thrown into action the justifying-slide shall be quickly arrested. As shown in Figs. 3, 5, and 6, each pawl has in its upper end a shoulder acted upon by a pin n^2, urged upward by spring n^3, the tendency of these parts being to hold the pawls out of engagement with the justifier-slide. The pawls are thrown into engagement at the proper time by a cross-bar X, carried by arms on a horizontal rock-shaft x and urged toward the pawl by pins x^3, actuated by springs x^6, which are of sufficient strength to overcome the pawl-lifting springs n^3. The rock-shaft x is mounted in the frame and provided with a crank-arm x', acted upon at intervals by an underlying collar x^2 on the jaw-adjusting rod J, heretofore referred to.

The action of the parts is as follows: The composed line of matrices and spacers is lowered between the jaws D and E, which are separated at this time a distance considerably greater than the length of the line, so that it may descend freely and without disarrangement to the required position. This extreme separation of the jaws is effected by the elevation m' on cam M. After the line is in position between the jaws the cam M permits the jaw E through the influence of rod J and connected parts to move inward until its distance from the opposing jaw D is but slightly in excess of the length of the required justified line—say .015 of an inch. As the closing of the jaw is completed, the collar on the rod J acts through the intermediate parts to disengage the pawls n' from the justifying-slide N, leaving it free to rise. The wedge O, being released by cam W, is urged forward by spring S and lifts the slide N, which raises the wedge spacers B gently through the matrix-line, elongating the same until it fills the space between the jaws, after which the cam M permits the jaw E to further advance and effect the slight compression of the line necessary to reduce it to the required length and to seat the matrices together in a tight compact body. After the machine has operated to cast the linotype against the matrices, as usual, the projection m^3 on cam M acts to retract the jaw E to its outermost position, and thereby release the line, so that it may be lifted out without resistance preparatory to distribution in the usual manner. This extreme opening of the jaw is accompanied by the engagement of the pawls with the slide N, which has in the meantime been permitted to descend through the retraction of the wedge O by cam W.

It is usual in the linotype-machine of commerce to open the jaws and release the line momentarily after it has been justified, and this in order to reduce the friction between the side faces of the matrices and spacers to admit of their being easily pushed edgewise into exact alinement against the vertical face of the mold. I provide for this momentary relief of the line by forming cam M with an intermediate elevation m^4, which causes a slight and brief retraction of the jaw E after justification. During this opening action the lifting influence of the wedge O on the justifying-slide N continues, but the timely en-

gagement of the pawls n' prevents the slide from rising farther, and consequently the spacers remain at rest and further elongation of the line is prevented, while the slide N, remaining in position, holds the spacers in the loosened line up to their previously-adjusted positions. As soon as the alinement against the mold is effected the elevation m^4 of the cam ceases its action and the jaw E closes again upon the matrix-line, reducing it to its former justified length, which remains unchanged until after the casting action. It will be observed that the dogs n' prevent the rise of the justifying-slide and spacers whenever the space between the jaws exceeds that to which the line is to be elongated, and that consequently the elongation of the line at improper times is prevented, although the wedge O continues to exert its upward pressure on the justifying-slide.

It will be observed that when the jaw E is in its innermost position the cam or eccentric G stands "on the center," or practically so—that is, with its point of greatest eccentricity in line between the axis and the jaw—so that the jaw receives accurate adjustment and a solid support, the spring L being of sufficient strength to move the parts in every instance to their proper final position.

The first outward movement of the jaw E—that is to say, its wide separation from its companion to permit the descent of the matrix-line—is not an essential part of my invention and is not necessary, although it facilitates the entrance of the matrices. It is sufficient for my purposes if the jaw E is first retracted, so that its distance from its companion exceeds the final length of the line an amount equal to the compression which is to be effected, or, in other words, .015 of an inch, more or less.

It will be observed that the essential feature of the invention lies in the slightly-excessive separation of the jaws and in the advancement of the spacers gently through the line and a final compression to determine the length of the line.

It will be obvious to the skilled mechanic that the means for effecting the movement of the jaw for elevating the justifier-slide and for preventing its rise at improper times can be greatly modified without departing from the limits of my invention. The construction herein shown is found a convenient one for the conversion of the machines such as shown in Letters Patent No. 565,490, and the drawings herein represent such a machine as altered to use the double wedge spacers in place of the original stepped spacers.

During the justification of the line it elongates from the fixed jaw, and the wedge spacers are of course carried laterally in the expanding line. In order to prevent them from dragging at their lower ends on the top of the justifier-slide and being bent thereby, I prefer to mount the slide, as shown in Fig. 2, so that it may move laterally under the frictional influence of the spacers in the direction in which the line elongates. As shown in the drawings, the guides of the slide are free to move horizontally in the main frame against the pressure of springs Z. In practice it is found that this lateral movement aids in relieving the spacers from strain and friction. The essential feature of the invention in this regard lies in mounting the device which advances the series of spacers through the line so that it may move laterally with the spacers as the line elongates.

In order to hold the short slides of the spacers down in the line during justification, the first elevator C, in which the line is sustained, is provided with an inside rib or jaw *e*, overlying the front ears of the spacers, as shown in Figs. 7, 8, and 9. As shown in Fig. 8, the under edge of this rib is preferably inclined from the horizontal, and this inclination has a double advantage—first, it permits the spacers, which are subjected to an upward thrust, to work laterally in the direction in which the line elongates more easily than would otherwise be the case, and, secondly, it allows the short space members or wedges to rise somewhat during the justifying action, so that at different times different portions of the wedge will be presented at the casting-level, or, in other words, different portions will be submitted at different times to the action of the molten type-metal. In consequence of this fact there will be less tendency of the metal to corrode the spacers and to adhere to their sides than in the ordinary machine.

My improvements are of course applicable in machines using either matrices or dies.

By the expression "wedge spacers" used herein is meant solid or incompressible spacers of wedge form having continuous or tapered surfaces as distinguished from spacers increasing in thickness step by step, the compressibility of my composed line being due to the existence of the numerous joints between the matrices and spacers and not to the compressibility of the spacers.

Having thus described my invention, what I claim is—

1. In a justifying mechanism and in combination with a composed line of solid metal dies and solid metal spacers thicker at one end than at the other, mechanism for advancing the spacers with gentle pressure through the line until the latter slightly exceeds the predetermined length, and thereafter compressing the line endwise to said length.

2. In a justifying mechanism and in combination with a composed line of matrices and incompressible wedge spacers, means for advancing the spacers gently through the line until the latter exceeds the desired length, and means acting thereafter to compress the line to the final length.

3. In a justifying mechanism, a combination of abutments to limit the length of the line, means for presenting a composed line of

matrices and solid wedge spacers between the abutments, means for permitting the primary separation of the abutments to an extent slightly greater than the length of the required line, means for gently advancing the spacers through the line while the abutments are thus separated, and means for thereafter effecting the compression of the line to the final length.

4. In a justifying mechanism, the combination of matrices and incompressible wedge spacers with the two jaws or abutments, mechanism for advancing and releasing one of said jaws, a justifying-slide, spring connections to advance said slide against the spacers, and means to prevent the advance of the slide until the jaw is closed to approximately its final position.

5. In a linotype-machine the combination of a series of incompressible matrices, a series of incompressible wedge spacers having continuous as distinguished from stepped surfaces, two matrix-confining jaws, one movable to and from the other, means for advancing and releasing the movable jaw, a spring-actuated justifier-slide to advance the spacers through the matrix-line, and mechanically-controlled dogs to arrest the advance of the slide, when the movable jaw is released, whereby the spacers are adjusted by a single action to positions required for justification of the line.

6. In a justifying mechanism, in combination with means for sustaining the composed line of matrices and wedge spacers, a justifier-slide arranged to act against the series of spacers and mounted to move laterally with the spacers as they are carried sidewise by the elongation of the line.

7. In a linotype-machine, the elevator or line-support C, having a lip or rib *c* to hold down the space members, said lip inclined from the horizontal on its under side in the direction of the length of the line, substantially as described.

8. A linotype-machine having an elevator provided with a top wall, beveled longitudinally of the line of matrices.

9. A linotype-machine having an elevator provided with a top wall, having portions at different points of its length located at different distances from the line of matrices.

10. In a linotype-machine for the use of incompressible matrices and incompressible wedge spacers, the combination of the opposing jaws D and E, the cam M having three elevated surfaces, intermediate jaw-operating devices through which the cam effects the three retractions of the jaw, the justifier-slide N and means for urging the same upward to advance the spacers through the line, and locking devices to arrest the advance of the slide when the jaw is retracted beyond the limits of the matrix-line.

In testimony whereof I hereunto set my hand, this 7th day of June, 1900, in the presence of two attesting witnesses.

FRANK A. VINTON.

Witnesses:
BERNARD A. SCHMITZ,
HENRY SCHMITZ.