

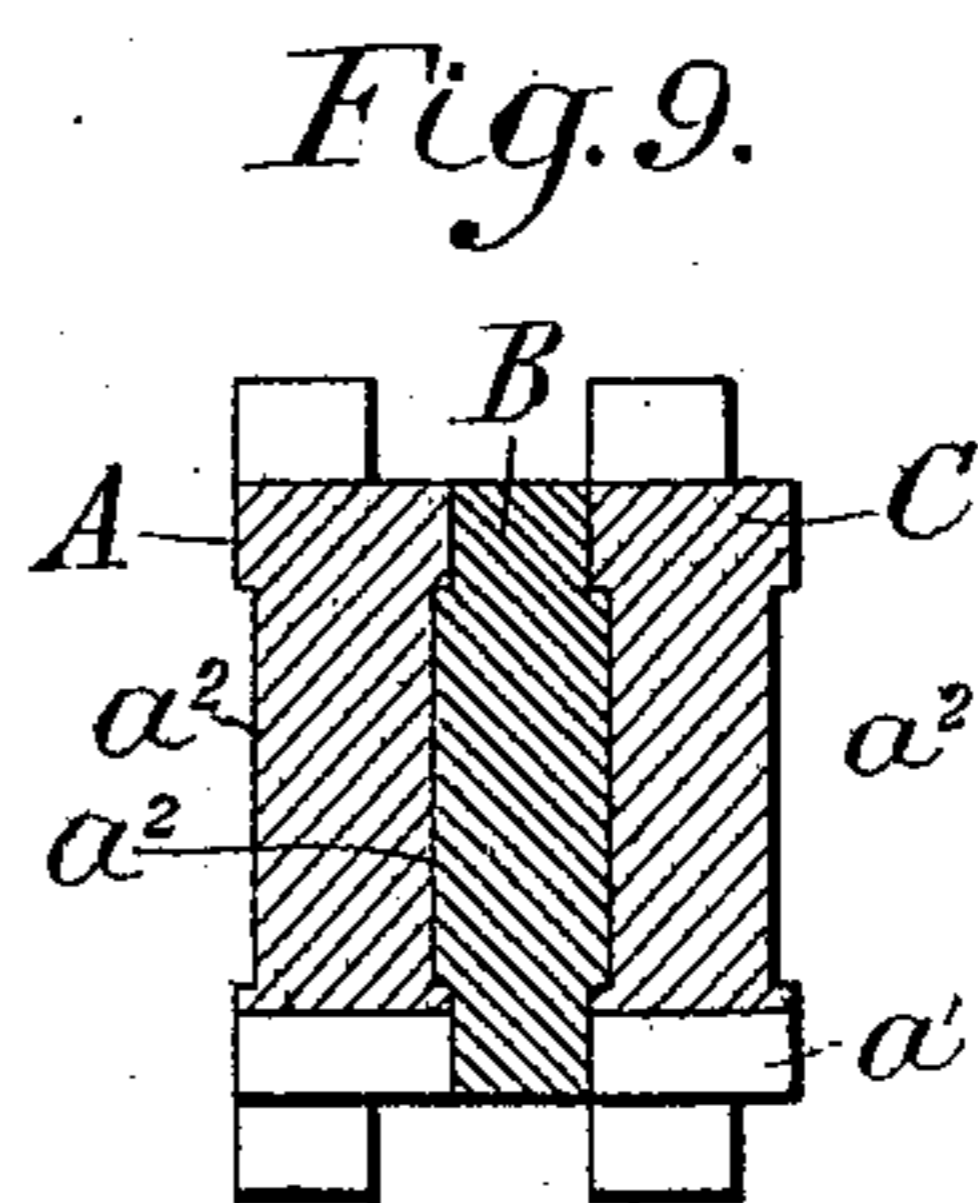
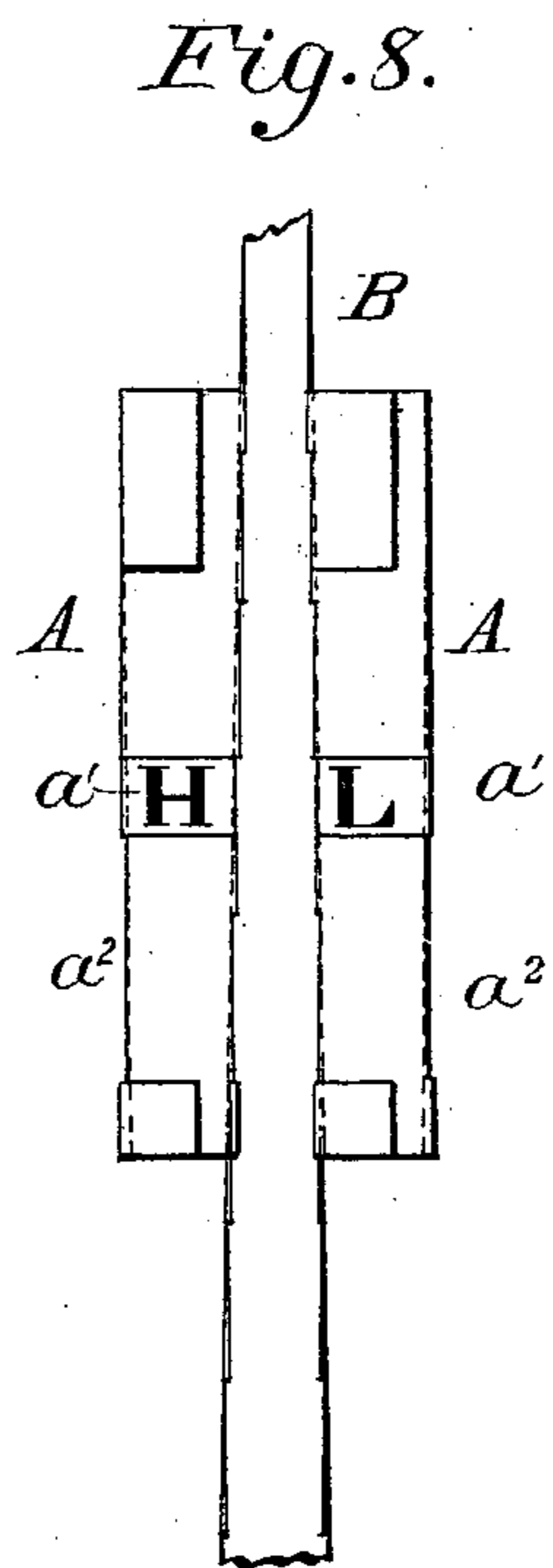
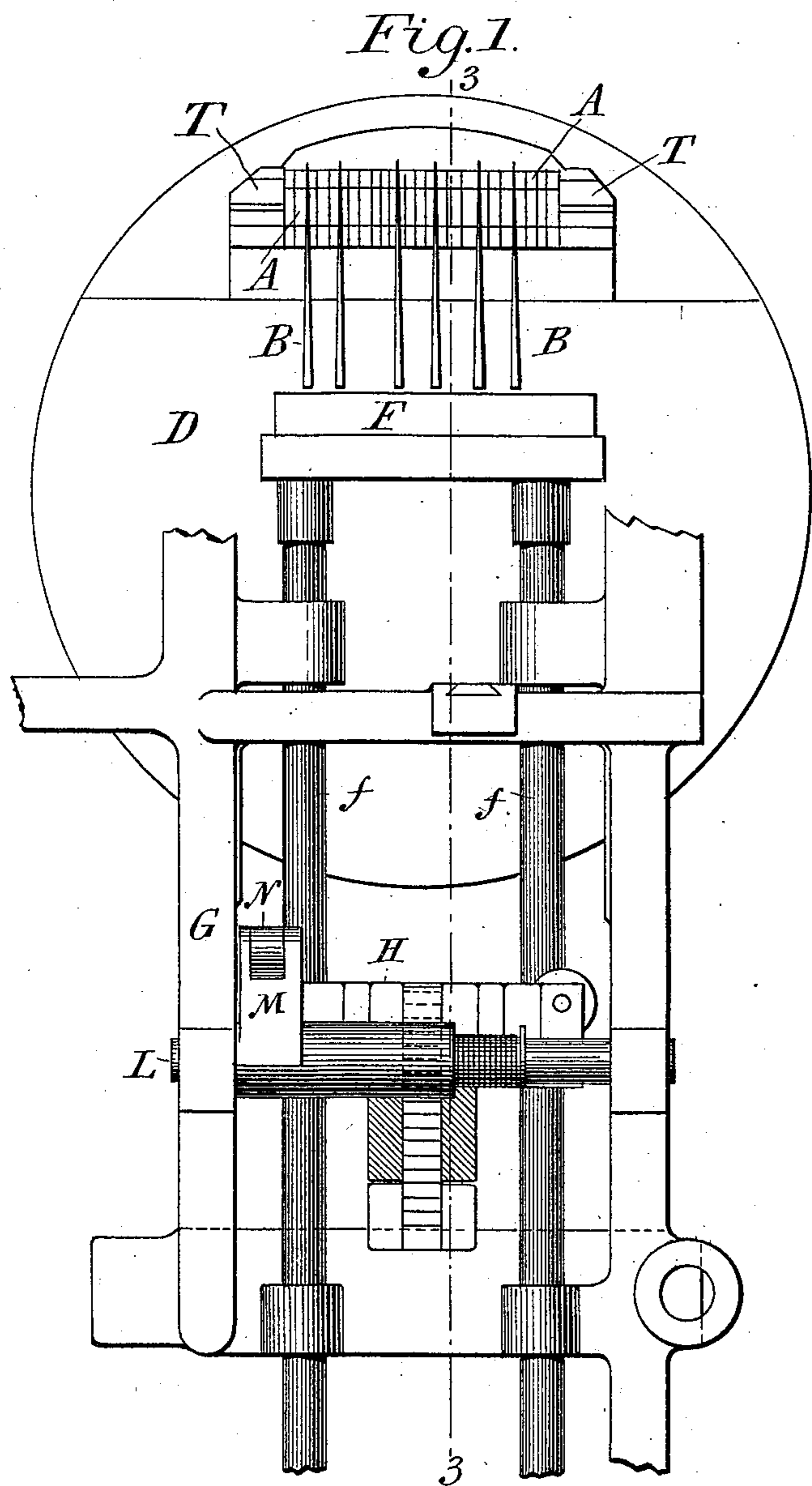
(No Model.)

3 Sheets—Sheet 1.

W. S. SCUDDER.  
LINOTYPE MACHINE.

No. 565,515.

Patented Aug. 11, 1896.



Witnesses:

*J. E. Munn*  
*D. P. Gallatin*

Inventor:

*W. S. Scudder*  
By *P. T. Dodge*  
Attorney

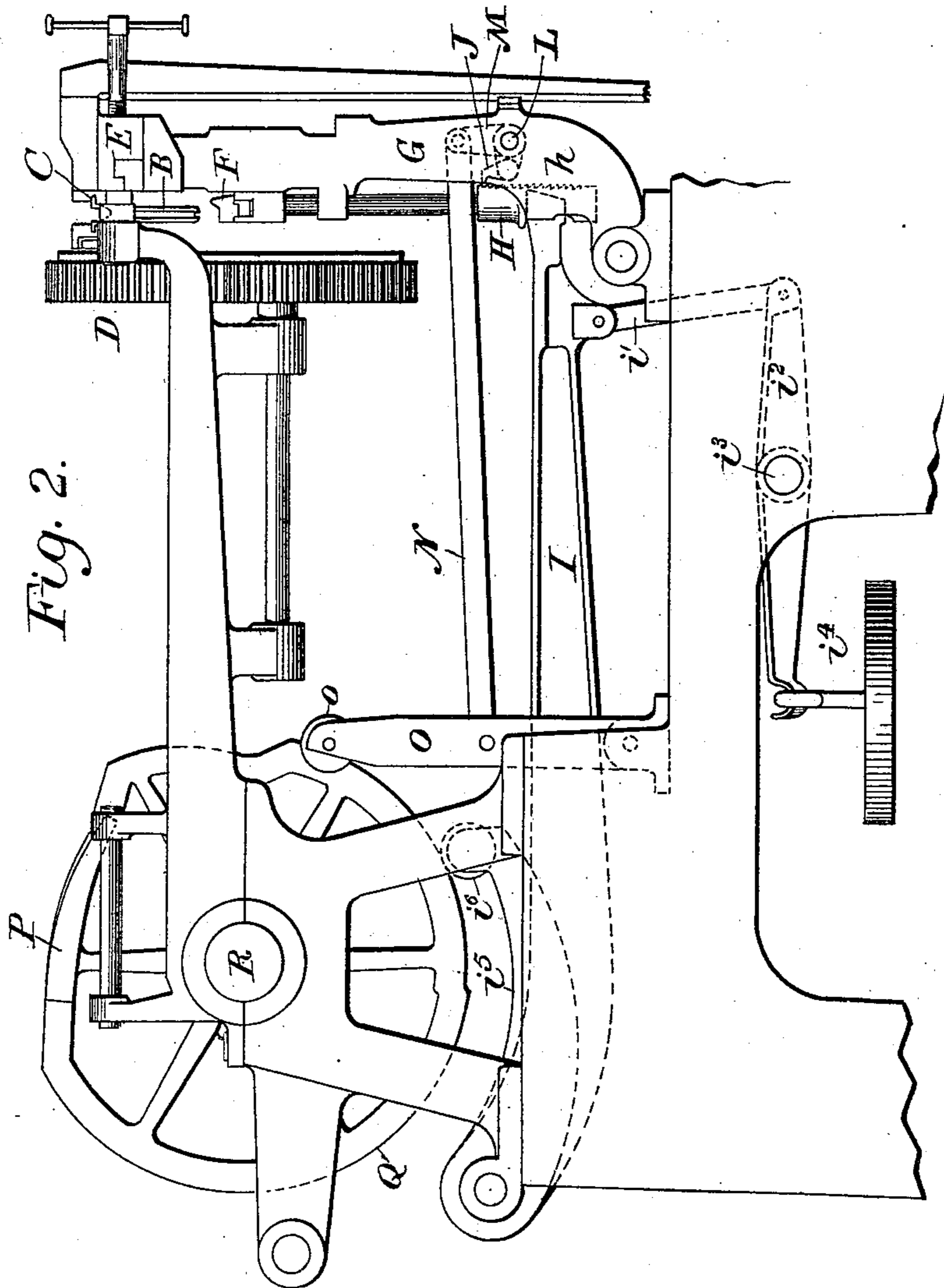
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3 Sheets—Sheet 2.

W. S. SCUDDER.  
LINOTYPE MACHINE.

No. 565,515.

Patented Aug. 11, 1896.



Witnesses:  
*J. E. Moore*  
*W. J. Gallatin*

Inventor:  
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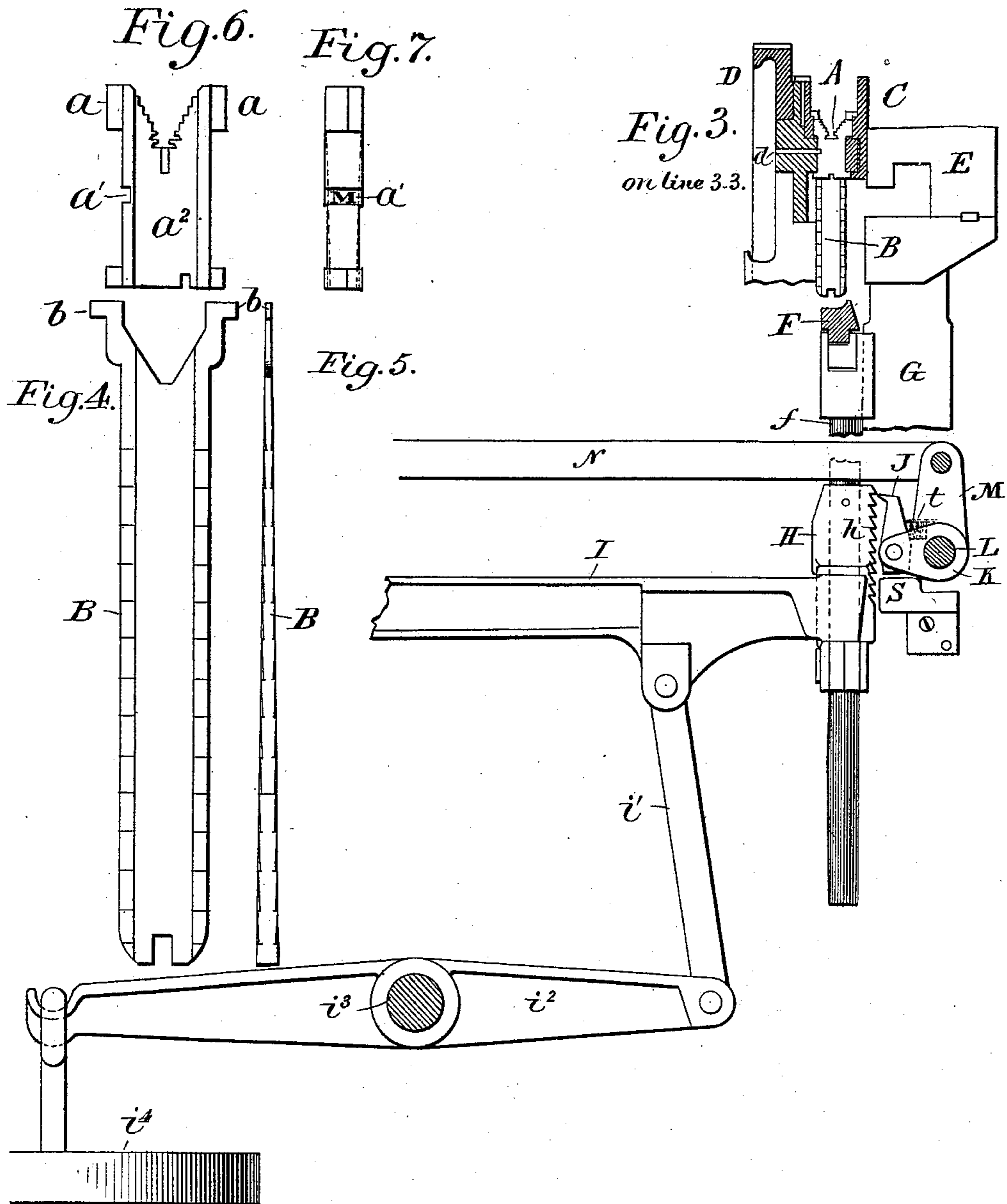
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*D. J. Gallatin*

Inventor:

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By *P. T. Dodge*  
Attorney

# UNITED STATES PATENT OFFICE.

WILBUR S. SCUDDER, OF BROOKLYN, NEW YORK, ASSIGNOR TO THE  
MERGENTHALER LINOTYPE COMPANY, OF NEW JERSEY.

## LINOTYPE-MACHINE.

SPECIFICATION forming part of Letters Patent No. 565,515, dated August 11, 1896.

Application filed April 16, 1892. Serial No. 429,497. (No model.)

*To all whom it may concern:*

Be it known that I, WILBUR S. SCUDDER, of Brooklyn, county of Kings, and State of New York, have invented a new and useful  
5 Improvement in Linotype-Machines, of which the following is a specification.

My invention has reference to a mechanism for justifying type dies or matrices, and is intended more particularly for use in what is  
10 now known as the "Mergenthaler linotype-machine," in which a series of matrices representing individual characters are assembled temporarily in line and the line thereafter  
15 justified and presented against the open face of the mold in order to produce raised type on the edge of the bar or linotype formed in the mold.

The present invention is directed to overcoming the objections which attend the use of  
20 the two-part spaces in common use, and to the substitution therefor of solid spaces, each consisting of a single wedge-like member, operating in direct contact with the adjacent matrices in the line. It is also directed to the ad-  
25 vancement of the spaces through the line positively and through definite distances, step by step, so that I secure a unit system of spacing and its attendant advantages.

I propose to use, in connection with the  
30 operating or advancing mechanism, tapered space-bars in connection with matrices having beveled or inclined side bearings after the manner described in detail in my application for Letters Patent of the United States,  
35 filed on the 5th day of November, 1890, Serial No. 365,815; but it is to be understood that this mechanism may also be used advantageously in connection with other forms of tapered space devices, and with those composed  
40 of two parts or wedges, as well as with those made in a single piece.

In the accompanying drawings I have represented my mechanism in its preferred form, in which it has been found to operate with  
45 entire satisfaction, but it will be evident to the skilled mechanic, after the reading of the specification, that the details of construction may be modified in many respects without departing from the scope of invention.

50 In the form shown the parts are constructed with special reference to their use in the

Mergenthaler machine of the form represented in Letters Patent of the United States issued to Ottmar Mergenthaler on the 16th day of September, 1890, No. 436,532. 55

Inasmuch as the mechanism for assembling the matrices and space-bars in line, for clamping and confining the line, and for presenting the line to the mold, may be in all respects identical with those in said patent, it  
60 is deemed unnecessary to describe or illustrate them in detail herein, and this specification and the accompanying drawings are therefore illustrative of such parts as are immediately associated with my improvement. 65

Figure 1 is a front elevation showing an assembled line of matrices and spaces, the clamps for limiting the length of the line, the mold, and the mechanism for advancing the spaces through the line to effect the justification. Fig. 2 is a side elevation of the parts represented in Fig. 1, together with the other operating parts of the justifying mechanism. Fig. 3 is sectional elevation on the line 3 3. Fig. 4 is a side view of one of my  
70 space-bars; Fig. 5, an edge view of the same; Fig. 6, a side view of one of the matrices; Fig. 7, an edge view of the same; Fig. 8, an edge view showing, on an enlarged scale, the matrices and a space-bar in operative relations. 80

Referring to the drawings, A A represent the series of matrices, each consisting of a thin plate of brass or other material, having in its upper end, as shown in Fig. 6, the sustaining-shoulders *a*, and in its forward edge  
85 an intaglio character or matrix proper, *a'*. Each of these matrices has vertical side faces, so that when they are assembled in line side by side they will bear firmly against each  
90 other and maintain their parallel positions. In opposite sides each of these matrices is channeled or grooved longitudinally, as shown at *a*<sup>2</sup>, the channel increasing in depth toward the lower end, so that it presents an  
95 inclined bearing-surface for the space-bar to act against, as hereinafter described in detail.

B B represent the series of space-bars, each formed complete in one piece, of a length considerably greater than the matrices and  
100 with sustaining-shoulders *b* at the upper end, whereby they may be sustained at suitable

points in the line of matrices during the composition of the line. Each space-bar is tapered gradually from the lower and thicker end upward, so that it presents, when viewed edgewise, the form of a long thin wedge. On each side the central portion of the wedge, from one end to the other, presents a smooth uninterrupted surface, adapted to fit within the channel of an adjoining matrix and bear against the inclined surface of the latter. The edges of the space-bar which project beyond the channel of the matrix, so as to stand flush with the edges of the matrix at the front and rear, are reduced in thickness step by step from one end of the bar to the other, as shown in Figs. 4, 5, and 8. The edge of the space-bar presents, therefore, a series of parallel vertical faces on opposite sides, the spaces between these faces being successively narrower as the upper end of the bar is approached. In assembling or composing the line matrices representing the required characters are selected and brought together in the ordinary manner and at suitable intervals. Wherever a space is to occur, a space-bar is introduced with its thin end uppermost, as shown in Fig. 1. After the composition of the line is complete justification is effected by forcing these bars upward, their central or wedge-like portion, bearing against the inclined faces of the matrices, separate the latter, the separation increasing as the bars are moved upward. The parts are so proportioned and arranged that as the space-bars are moved upward the flat side faces on their upward edges enter successively between the characters or matrices proper, filling the space between the character of one matrix and the next so closely or so nearly that the entrance of metal between the matrices and space-bars is impossible or so slight as to be immaterial. The spaces or sections on the space-bars are preferably of a length considerably less than the length of the matrix-bodies. In construction and in their mode of coöperation the matrices and space-bars above described are substantially the same as those set forth in my previous application.

In order to obtain the most advantageous action of the space-bars, it is necessary that they shall be advanced through the line step by step and each space stopped in such position that one of its flat sections at the front edge shall fit in closely between the adjoining matrix, as shown in Fig. 8. In other words, it is desirable to prevent the space-bars from stopping at uncertain points or in such manner that the shoulders on their front edges come adjacent to the matrix-characters, as this would permit the entrance of the metal and result in the formation of burs or projections on the linotype. In order to insure this step-by-step movement of the spaces, I provide the mechanism shown in the drawings, in which C represents a vertically-movable

yoke in which the line of matrices and spaces are suspended by the ears at their upper ends.

D is the mold-wheel, having the mold or slot *d* extended therethrough from front to back, its front side being closed by the line of matrices and spaces presented against it, so that the metal delivered into the mold to form the linotype will receive on its front edge the impress of the series of matrices, as in the ordinary Mergenthaler machine.

E is the usual anvil or support, by which the matrix-supporting yoke C is sustained against the pressure of the mold.

F is a vertically-movable plate lying beneath the lower ends of the space-bars when the latter are in operative position, for the purpose of driving them upward through the line. This plate F may be sustained and guided in any suitable manner, but, as shown, it is carried by the upper end of the two guide-rods *f*, guided in the stationary frame G. To these rods *f* there is fixed a cross-plate H, acted upon by the end of a lift-lever I, which is pivoted to the main frame at *i* and urged upward by a link *i'*, connected to one end of the lever *i*<sup>2</sup>, mounted in its turn on a central pivot *i*<sup>3</sup> and provided at its rear end with a weight *i*<sup>4</sup>. When the parts are released, this weight acts through the intervening device to force the plate F upward and push the space-bars through the line with a moderate pressure. The points to which the weight will advance the space-bars are uncertain. The plate H, through which the space-bars are lifted, is therefore provided on its front face with a series of ratchet-teeth *h* in position to be engaged by a pawl or dog J, carried by a short lever K on a horizontal rock-shaft L, mounted in bearings on the frame, this shaft being in turn provided with an arm M, from which an operating-bar N is extended rearward to a lever O, pivoted at its lower end to the main frame. The upper end of this lever is provided with a roller *o*, acted upon at intervals by a cam-surface P on a large cam-wheel Q, mounted on the horizontal main shaft R. The lower end of the pawl J is flattened and arranged to strike, when the pawl is lowered, on an underlying plate S, which acts to throw the upper end of the pawl out of engagement with the teeth of the plate H. The spring *t* behind the pawl tends to urge it into engagement.

The lifting-lever I has a side arm *i*<sup>5</sup>, carrying a roller *i*<sup>6</sup>, acted upon by the peripheral surface of the cam-wheel Q, which serves to depress the lever and the justifying-bar F, and to control their rising action under the influence of the weight.

The parts, being properly shaped and arranged as shown, operate as follows: The composed line of matrices and space-bars is presented in front of the mold and between the clamps or jaws T, which are properly adjusted to limit its length. At this time the lifting-lever I and plate F are held down by

the cam Q, and the pawl J is held out of action. As the cam Q revolves it permits the lever I to rise under the influence of the weight, so that the plate F pushes the entire series of  
 5 space-bars upward between and in contact with the matrices until an approximate justification of the line is effected. During this action a greater or less number of the teeth H are carried upward past the end of the  
 10 dog J. As the cam-wheel continues its revolutions, and after the advance of the spaces, by means of the weight, has ceased, the cam P acts upon the lever O and forces it forward, causing it, through the intervening  
 15 parts, to rock on shaft L and carry the pawl or dog J upward. As the pawl rises clear of the stop s its upper end engages that tooth h which chances to be next above it, and as the dog continues to rise it carries the plate  
 20 H, and with it the bar F, upward until each space-bar presents one of its flat front faces fully between the adjacent matrix-characters, as shown in Fig. 8, thus completing the justification. The teeth h have a length corresponding with that of the sections or shoulders at the front edge of the space-bars, and the parts are so arranged and proportioned that the dog J will in each instance advance the spaces only the length of one section or  
 30 less, and in every instance lift them with their vertical side faces between the matrix-characters, as before explained.

The points at which the teeth h, advanced by the wedge, stop in relation to the end of the pawl J will vary, so that the pawl will in some cases be required to move the parts a greater distance than at other times. In each instance, however, the dog will move the parts a distance not exceeding the length  
 40 of one tooth or section.

It will be observed that the final justification is effected in a positive manner, and that the wedges are advanced definite and equal distances and stopped always at definite  
 45 points, so that the extension of the line occurs step by step. In other words, each advance of the space-bars effects a definite increase in the width of the spaces. In this regard a clear distinction is to be drawn between this system of spacing and the ordinary  
 50 system now in use, in which the spacing is effected by imperceptible and uncertain distances from one extreme to another. I find in practice that this method of justifying is  
 55 in every way practical and satisfactory, when used in connection with matrices and a mold, for producing linotypes of uniform length. I find that, although the clamps or jaws which determine the expansion or elongation of the  
 60 line are always set at the same distance apart and fixed rigidly for the time being, it is possible in every case to force the wedges positively home to their places in such manner as to effect a perfect justification and to  
 65 force the matrices into such intimate contact with each other and with the space-bars as

to prevent the passage of the molten metal between them. In other words, I am enabled, by the method and means above described, to produce perfectly-justified linotypes of  
 70 uniform length without fins, spurs, or other objectionable projections thereon.

It is of course to be understood that the essence of my invention resides in combining with space-bars, each of greater thickness at  
 75 one end than at the other, means by which they are positively advanced through the line to definite positions, as distinguished from mechanisms in which the final positions of the space-bars are a matter of chance and  
 80 uncertainty.

While I prefer to make use of space-bars in the particular forms herein shown, it is to be understood, of course, that I may use any equivalent form of space-bars which are  
 85 thicker at one end than at the other, so that they will present an increasing thickness in the line as they are advanced therethrough. It is to be understood that in place of the weight and levers herein shown I may employ a spring or other mechanical equivalent  
 90 as a means of effecting the preliminary advance of the spaces.

While I have described my invention in connection with matrices for producing characters in relief, it will of course be understood that it may be used in the same manner and with the same effect in connection with type dies or punches adapted to form  
 95 type impressions or matrices in papier-mâché or other material in which to cast or form type-metal or plastic material.

I believe myself to be the first to provide in any form or arrangement a mechanism by which a series of tapered spaces are advanced  
 105 through the type-line positively, step by step, a definite and predetermined distance at each movement. I also believe myself to be the first to provide in any form or manner mechanism by which stepped spaces are thrust through  
 110 the line definite distances and stopped in predetermined positions or relations to the type, so that a shoulder or step, if entered at one end between the adjacent type, is positively carried forward into the line until  
 115 fully entered. The result of these actions is, first, that each space is caused to add a definite and predetermined amount to the line each time that it is advanced; second, that when a step on a space is entered in  
 120 the line, it is compelled to advance so far as to span the mold and tightly fill the space between the adjacent matrices. In other words, the arrangement prevents the spaces from stopping with the shoulder or step partly  
 125 entered between the matrices, so as to destroy their parallelism or leave a space through which the molten metal could escape from between the matrices.

I am aware of a prior mechanism in which  
 130 spaces, increasing in thickness step by step, have been advanced one after another, one

step at a time, through the loose matrix-line by a yielding pusher, as shown in the application of Ottmar Mergenthaler, Serial No. 327,079.

5 I believe myself to be the first person to advance a series of spaces through a line positively to a predetermined point, the first to advance spaces simultaneously through the line with a yielding pressure and thereafter  
10 to advance them positively to predetermined points, and the first to employ a ratchet mechanism for advancing spaces through the line.

Having thus described my invention, what  
15 I claim is—

1. In a justifying mechanism, a line of matrices and space-bars thicker at one end than at the other, in combination with means applying a yielding pressure to said bars to advance them endwise through the line, and  
20 means for thereafter advancing the bars positively to a predetermined position.

2. In combination with a line of type-matrices and tapered space-bars therein, mechanism for positively and simultaneously advancing said bars through the line to predetermined positions.  
25

3. In combination with a line of matrices and tapered space-bars therein and jaws or abutments to limit the elongation of the line, means for advancing said space-bars with a yielding pressure through the line, and means for thereafter advancing the space-bars positively to a predetermined point.  
30

4. In combination with a line of matrices means for limiting the elongation of the line, a series of space-bars thicker at one end than at the other, seated in said line, means for advancing said space-bars through the line to  
40 predetermined points.

5. In combination with a series of matrices assembled in line, means for limiting the elongation of said line, a series of tapered space-bars seated in the line, means for advancing the same through the line with a

yielding pressure and means for further advancing said bars with a positive action.

6. In a linotype-machine a series of matrices assembled in line, means to limit the elongation of the line, a series of tapered space-bars  
50 seated in the line, a pusher operated by a weight or its described equivalent to advance the spaces preliminarily through the line, a ratchet mechanism for further advancing the spaces with a positive action the distance of  
55 one tooth, or less, as their first position may demand.

7. In combination with a line of matrices having inclined bearing-faces on their sides, means for limiting the elongation of said line, tapered space-bars seated in the line, and each presenting at one edge portions of successively-increasing thickness and mechanism for advancing said space-bars through the line positively and to definite positions,  
65 substantially as described, whereby the justification of the line may be positively effected, and the space-bars caused to closer fill the spaces between the matrix-characters and the matrices proper.  
70

8. In a justifying mechanism, an elongated space, thicker at one end than the other, in combination with means for positively advancing said space through the line to a predetermined point.  
75

9. In a justifying mechanism, an elongated space, thicker at one end than at the other, in combination with means for advancing said line endwise through the composed line, until it reaches approximately the desired position, and means for thereafter advancing said space positively to a predetermined position.  
80

In testimony whereof I hereunto set my hand, this 17th day of March, 1892, in the presence of two attesting witnesses.

WILBUR S. SCUDDER.

Witnesses:

CHAS. H. BULKLEY,  
HENRY R. SUYDAM.