No. 676,306. Patented June 11, 1901.

W. FLETCHER.

MECHANISM FOR SPACING AND JUSTIFYING TABULAR WORK ON LINOTYPE MACHINES.

(Application filed Mar. 15, 1901.)

(No Model.) 3 Sheets—Sheet 1.

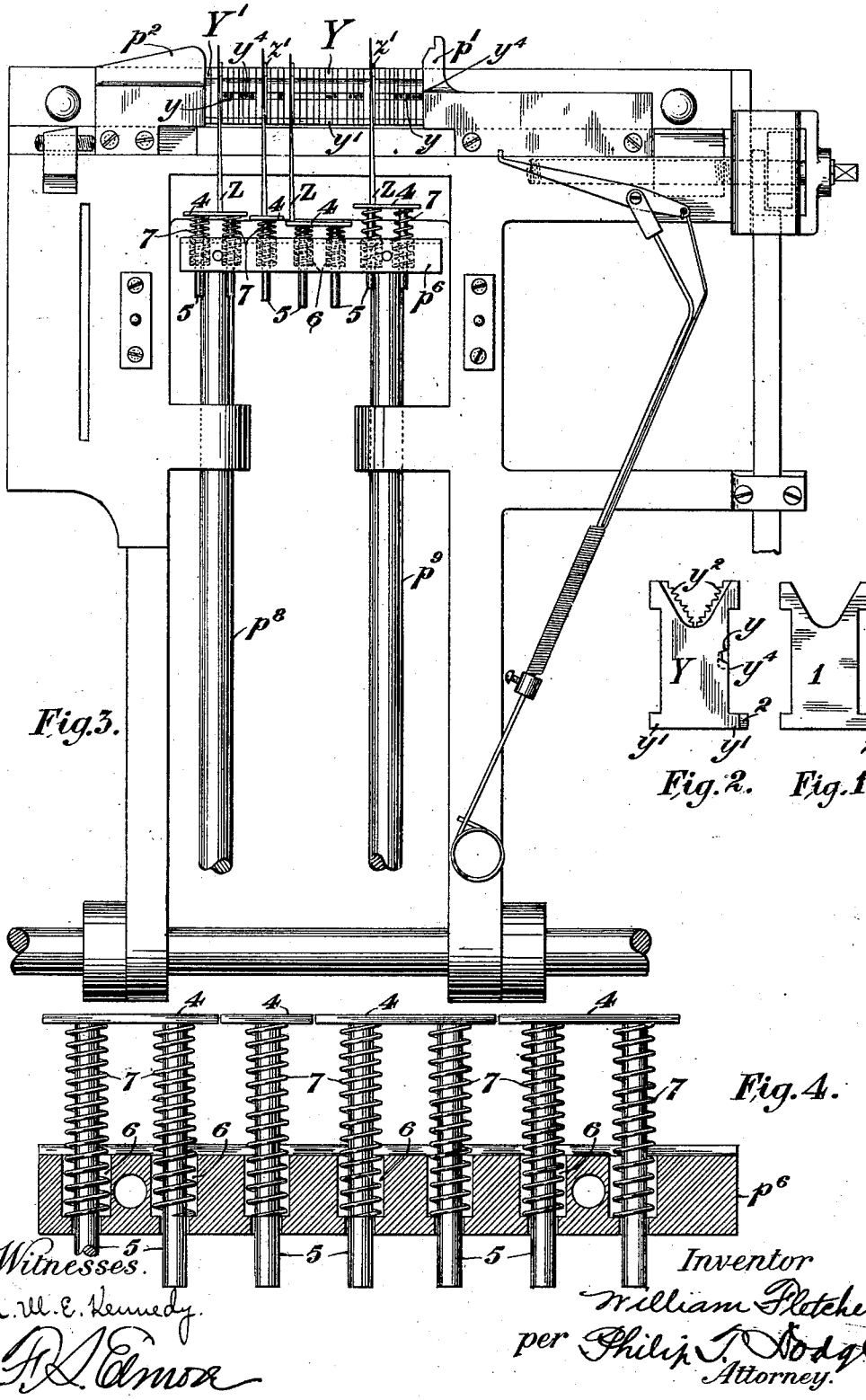

Fig.3.

Fig.2. Fig.1.

Fig.4.

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(No Model.) (Application filed Mar. 15, 1901.) 3 Sheets—Sheet 2.

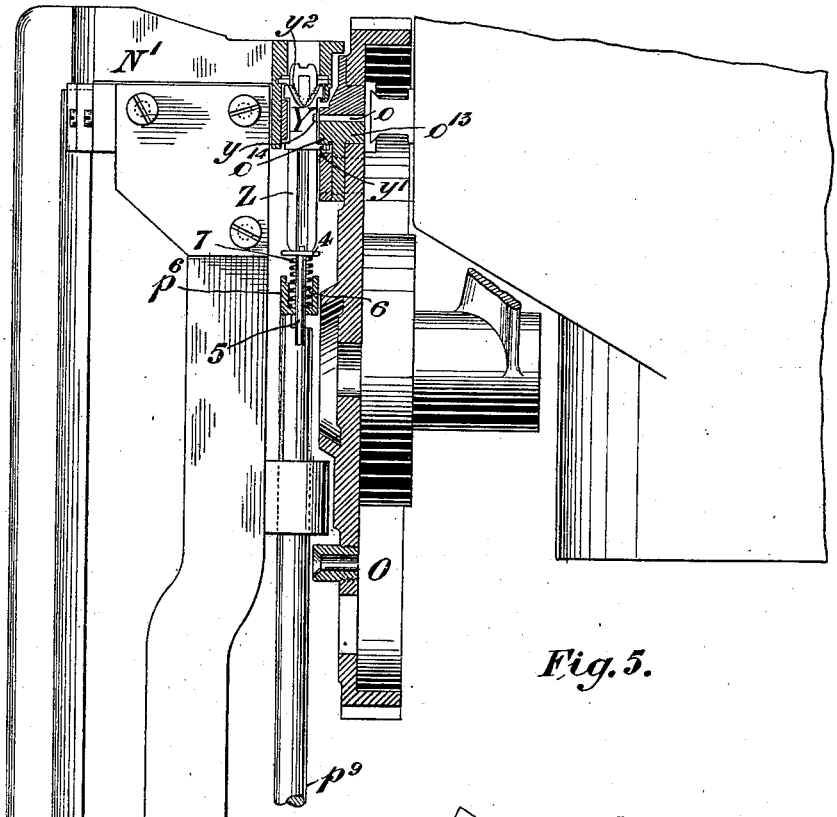

Fig. 5.

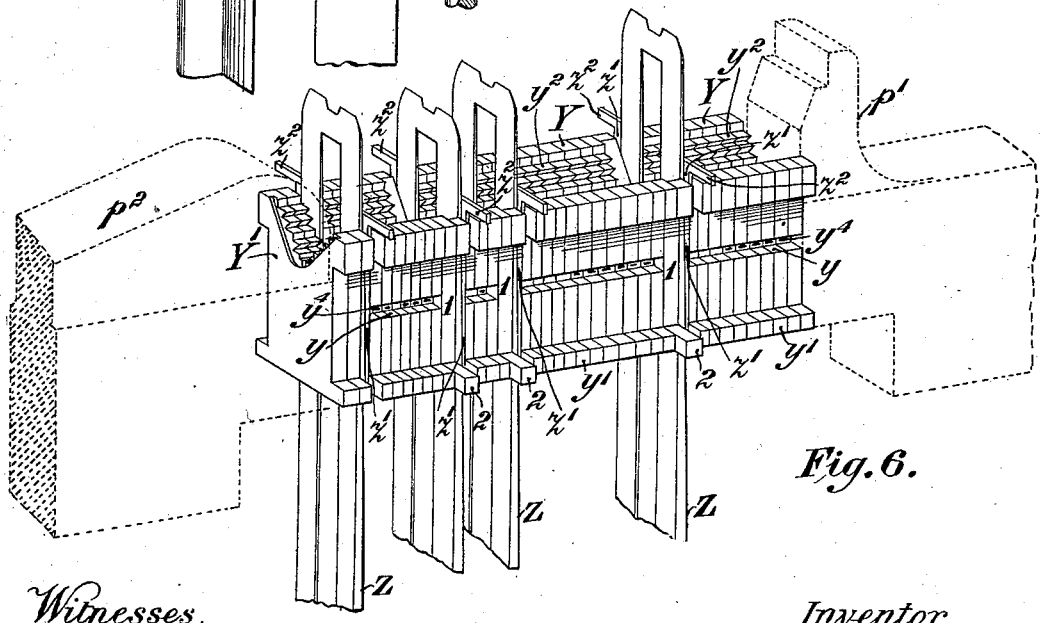

Fig. 6.

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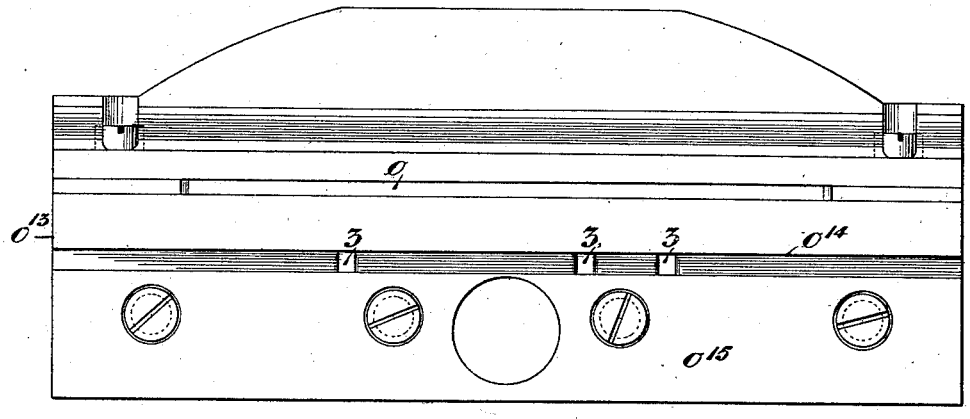

Fig. 7

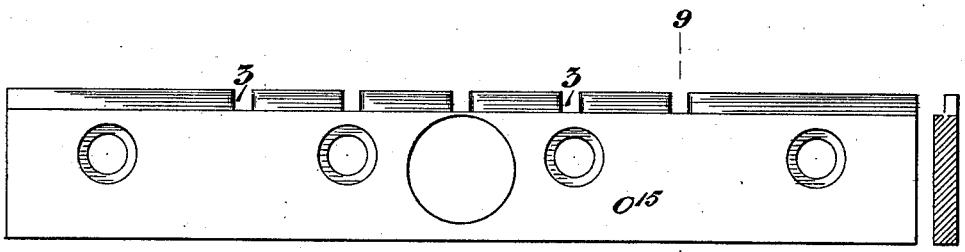

Fig. 8. Fig. 9.

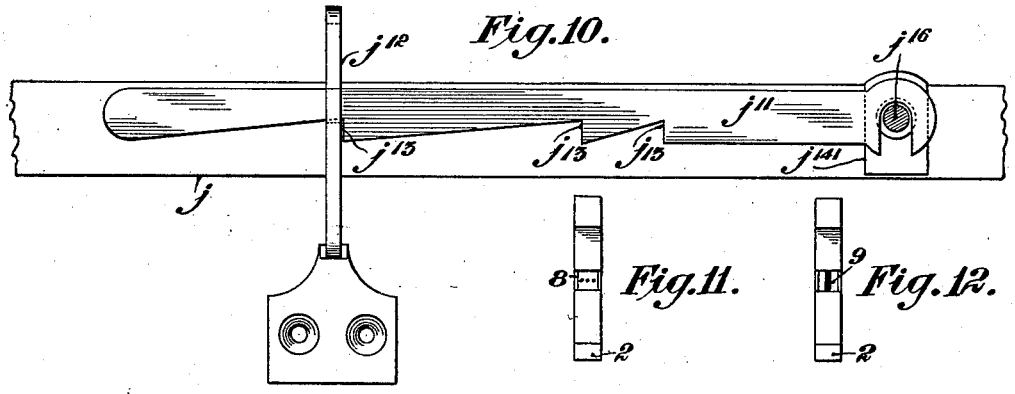

Fig. 10.

Fig. 11.

Fig. 12.

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UNITED STATES PATENT OFFICE.

WILLIAM FLETCHER, OF LONG ACRE, ENGLAND, ASSIGNOR TO THE MERGENTHALER LINOTYPE COMPANY, OF NEW YORK, N. Y.

MECHANISM FOR SPACING AND JUSTIFYING TABULAR WORK ON LINOTYPE-MACHINES.

SPECIFICATION forming part of Letters Patent No. 676,306, dated June 11, 1901.

Application filed March 15, 1901. Serial No. 51,357. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM FLETCHER, of Mercers avenue, Endell street, Long Acre, in the county of Middlesex, England, have invented a certain new and useful Improved Mechanism for Spacing and Justifying Tabular Matter Composed on Linotype-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The present invention relates to improved mechanism by which the operator can satisfactorily space and a linotype-machine is enabled to automatically justify tabular matter composed on it, the said invention being particularly applicable to the Mergenthaler linotype-machine described in the specification of Letters Patent No. 436,532, dated September 16, 1890. In this machine the composed line of matrices and space-bars for a given linotype is held for the purpose of being justified between two vise-jaws, one standing at each end of the line at a distance from its fellow equal to the standard length of the linotype to be cast from it. Each space-bar is a double wedge and they make the spaces between the words. These spaces are thickened and the composed line extended at the same time to the standard length by the act of extension or justification, which latter consists in the depending tails or single wedges of all the space-bars in the line being pushed up through the composed line over the respective single and stationary wedges. This justification is effected by an automatic lifting-plate, which acts first upon a space-bar at one end of the line and then upon all the others successively, so that it starts where the first space-bar is and continues throughout the line in the direction of that end of it which is next to the last space-bar, and during its continuance all the matrices and space-bars after the first space-bar are moved more or less toward the opposite vise-jaw. The two vise-jaws serve during the justification as abutments to limit the extension of the composed line to the standard length.

Tabular matter is divided into measures, so many measures to a line, two or more, as the case may be, all the measures for a given column in the table being of the same length. The operator may introduce one space-bar into each measure or into only some of the measures; but the ordinary justifying mechanism above described will make the measures of different lengths, because as there are no abutments at the ends of the several measures intermediate of the two end abutments above mentioned there is nothing to prevent one space-bar being thickened enough to push the adjacent end of the next measure out of register with the corresponding measure in the line above or below it. It is true that the operator may compose the measures tight by means of quads, thereby dispensing with the use of the space-bars above mentioned, but even then he will fail to secure perfect register.

The present invention consists in providing each measure in the matrix-line with an abutment intermediate of it and the next one, means by which the mold-block can hold the said abutment in the proper position, so that when the machine begins to justify each measure is between two abutments which limit its extension to the proper length, and means for justifying each measure independently of the other measures in the same composed line of matrices.

Referring to the accompanying drawings, which are to be taken as part of this specification and read therewith, Figure 1 is a side elevation of a measure-quad adapted to act as an intermediate abutment; Fig. 2, a side elevation of a Mergenthaler linotype-matrix and a measure-quad behind it; Fig. 3, a rear elevation of the vise-frame, vise-jaws, or line-end abutments, composed line of matrices, space-bars, and intermediate abutments, and means for justifying each measure by itself; Fig. 4, an enlarged sectional elevation of the justifying means of Fig. 3, showing it detached and out of action; Fig. 5, a sectional elevation from the right hand of the Mergenthaler linotype-machine, showing a composed line of matrices, intermediate abutments, and space-bars justified and in the casting position; Fig. 6, a perspective view of the same composed line from the rear, including the vise-jaws or end abutments in dotted lines; Fig. 7, a front elevation, on an enlarged scale,

of the mold-block of Fig. 5; Fig. 8, a front elevation, on the same scale, of a mold-block plate for a six-measure job; Fig. 9, a section on the line 9 9 of Fig. 8; Fig. 10, a front elevation of an emmeter for a four-measure job; Fig. 11, a rear elevation of a measure-quad adapted to act as a leader-matrix, and Fig. 12 a rear elevation of a measure-quad adapted to act as a vertical-rule matrix.

Y Y are the matrices; y y, the notches in their rear edges; y' y', the alining lugs; y^4 y^4, the formative cavities, one in the front end of each notch y; y^2 y^2, the distributing-teeth; p' p^2, the two vise-jaws; o, the slot in the mold-block o^{13}; o^{14}, the alining-shoulder on the said mold-block; o^{15}, the mold-block plate; O, the mold-block carrier; Z, a single wedge or depending tail; z', a stationary single wedge, and z^2 z^2 its supporting-shoulders, the two wedges constituting a space-bar; N', the head that holds the composed line in the casting position; p^6, the lifting-plate; p^8 p^9, the rods by which the machine works the plate p^6; j, the assembly-bar; j^{11}, the indicator of the emmeter; j^{12}, its stationary stop; j^{16}, its pivot fast to a block j^{141}, which in its turn is fast to the bar j, and j^{13} j^{13} shoulders on the indicator j^{11}. The job to be composed being a four-measure one, an indicator having its shoulders j^{13} set out thereon accordingly is selected, its nose entered into the stop j^{12}, and its opposite end dropped onto the pivot j^{16}. As there are four measures there must be four shoulders correspondingly placed to engage in turn with the stop j^{12}. The indicator j^{11} carries three of these—the shoulders j^{13}—the fourth being a block on the bar j, such as the block j^{141}. All the parts just described are as heretofore.

The emmeter illustrated is taken from the specification of Letters Patent No. 646,227, dated March 27, 1900; but no special emmeter is necessary to the action of the present invention, and the operator may rely upon any means for showing him when he has got to the end of a measure.

The present invention is used and acts as follows: There is a supply of "measure-quads" 1, as they may be called, in the sorts-box of the machine or in some other suitable receptacle. One of these is illustrated in Figs. 1 and 2 by the side of and behind a matrix Y to show the similarities and the differences between them. The differences are as follows: All of the same font are of a uniform and substantial thickness. They are of steel instead of brass, because the former material is harder than the latter, and as they are to act as abutments hardness in them independent of thickness is desirable. Their rear edges are (subject to the admissible modification described farther on) plain—*i. e.*, without notch y or cavity y^4. They have no distributing-teeth y^2, because they are intended to be left by the distributer when it takes up a composed line for distribution, and the bottom rear lugs 2 are nearly twice as long as the bottom rear lugs y' on a matrix Y. One of these measure-quads preceded by one space-bar is added to the growing line in the assembly-box at the end of each measure, excepting that a measure-quad is not added to the last measure for the same reason that one is not put at the head of the first measure. The reason why a measure-quad is not put at the head of the first measure nor at the end of the last one is that when the composed line of matrices, space-bars, and measure-quads is in the casting position it will find an abutment—the vise-jaw p'—for the commencement of the first measure and a second one—the vise-jaw p^2—for the end of the last measure, as clearly shown in Fig. 6. Further, the space-bar for the last measure is not at the end of that measure, but at the distance of a quad or two Y' or of a matrix or two therefrom to prevent friction between its long wedge Z and the vise-jaw p^2.

Single-wedge space-bars instead of the double-wedge ones may be used, if desired. Any grooves that the presence of the lugs 2 may require in the frame or other parts of the machine to make room for the said lugs as they pass from the point of assemblage toward the casting position, as in the back rail of the assembly-box I and in the rear side of the stationary guide-block M of the specification No. 436,532, of 1890, above mentioned, are provided for that purpose.

It is obvious that the measure-quads 1 cannot act as abutments unless they are held in their respective positions while the line is being justified, which positions are at the ends of their respective measures. The holding device consists of a corresponding number of sockets 3 in the face of the mold-block o^{13}, positioned therein according to that of the ends of the respective measures. The mold-block o^{13} is moved up from the rear to fit metal-tight up to the composed line of matrices, stopping for a few moments before it gets up so far as that for the justifying-plate p^6 to justify the composed line. The present invention takes advantage of that forward motion to make the sockets 3 engage over the respective projecting lugs 2, thereby making the measure-quads 1 true abutments. The sockets 3 are only just large enough to surround the projecting lugs 2, so that the measure-quads 1 shall be incapable of either vertical or horizontal motion during the act of justification. It is, however, advisable that the sides of the said sockets shall be flared or beveled outwardly a little, as shown in Fig. 7, and the noses of the said lugs be beveled or tapered off a little both top and bottom to facilitate the engagement of the sockets with them at the moment when the mold-block o^{13} comes up to them. This engagement is effected just before the justifying-plate p^6 begins to act on the space-bars and continues throughout its justifying action and until the cast linotype is clear of the composed line. Thus in the case of the job dealt with by

Figs. 1 to 7 and 10 the composed line consists of four measures. It has therefore three measure-quads 1 at the end of respectively first, second, and third measures, and these, with the two vise-jaws p' p^2, constitute four pairs of abutments, the two abutments of each pair holding all the elements of the respective measures between them and preventing that measure being extended beyond them.

The justification is conducted on the same general lines as described in the specification of Letters Patent No. 436,532, already referred to—that is, the matrices and quads are prevented from being pushed upward by the alining shoulder o^{14} on the mold-block o^{13} standing over the bottom rear lugs y' and the short wedges z' by the engagement of their lugs z^2 in the grooves in the elevator-head N', as shown in Fig. 5; but as each measure must be justified independently of the others the continuous justifying-plate p^6, that suffices for a continuous line, must be modified by being divided into as many independent plates 4 as there are measures. Each plate 4 is long enough to bear against the tails Z of all the space-bars that there may be in the respective measure and is short enough to clear the plate or plates next to it. This modification is shown in Figs. 3 and 4. The plate p^6 has heretofore been fitted with a removable top plate; but this is omitted to facilitate the connection of the plates 4 to the plate p^6. This connection consists of depending pins 5, one or more, according to the length of each plate 4, made fast thereto, vertical holes 6 in the plate p^6, in which they can work freely, and springs 7, one around each pin 5 and resilient between the plate p^6 and the respective plate 4.

The positions of the sockets 3 in the mold-block o^{13} must be fixed, and it is further desirable that a mold-block should carry sets of them for each possible change in the number and lengths of the measures. To meet these requirements, especially the latter one, they are cut in the top edge of the well-known mold-block plate o^{15}, which is part of the means by which the mold-block o^{13} is held to the mold-block carrier O. Each mold-block o^{13} may be fitted with several mold-block plates o^{15}, each one having a different set of sockets 3. Thus the plate o^{15} shown in Fig. 8 fits the mold-block shown in Fig. 7; but it has a set of five sockets 3 for a six-measure job. At the same time a plate o^{15} may have as many sets of sockets 3 as it can receive without a socket of one set running into a socket of another set. It is only when such running into in the case of one and the same plate o^{15} would occur that a substitute plate o^{15} becomes necessary.

Referring again to the measure-quads 1, it is obvious that their rear edges being plain they act also as quads at the end of their respective measures. Further, a measure-quad may be adapted to act also as a character-matrix—*e. g.*, as a leader-matrix by having a leader-formative cavity 8 punched in its rear edge, as shown in Fig. 11, or as a rule-matrix to cast part of a vertical rule on the printing edge of the respective linotype by having a part-vertical-rule-formative cavity 9 punched in its rear edge, as shown in Fig. 12.

The present invention is equally applicable to type-dies used to indent a stereotype-flong, and that being the case the appellatives "matrix" "matrices" are to be understood as including such type-dies. It is to be noted in this connection that the substitution of a type-die flong-indenting combination for the combination of mold-cavity o and row of formative cavities y^4 illustrated is well known and that the mold-block carrier O would in that case be the flong-carrier.

I believe myself to be the first to combine with a composed line of matrices means for dividing the lines into sections of predetermined length and means for justifying the matrices in each section or measure independently of those in the other section, and it is to be understood that I claim, broadly, means to this end in any form the mechanical equivalent of that herein shown and described, the details of construction being of secondary importance.

What I claim as my invention is—

1. In combination with a composed or assembled line of matrices, one or more abutments dividing the line into lengths or measures, means for holding said abutments immovably in position, and means for justifying each section or measure independently of the others.

2. The combination with a line of matrices composed for tabular work, of an abutment at and for each end of the said line at a distance from each other equal to the standard length of line; an abutment intermediate of each measure and the next one; means by which the said abutments are held in their respectively proper positions while the said line is being justified; and means for justifying each measure independently of the other measures in the line.

3. The combination of measure-quad; socket in the mold-block to hold the same against vertical or horizontal movement during the act of justification; means for enabling the mold-block to engage the said measure-quad and an independent plate on the justifying-plate, for each measure.

4. The combination of measure-quad adapted to act as a character-matrix; socket in the mold-block to hold the same against vertical or horizontal movement during the act of justification; means for enabling the mold-block to engage the said measure-quad; and an independent plate on the justifying-plate, for each measure.

5. The combination of measure-quad adapted to act as a rule-matrix; socket in the mold-block to hold the same against vertical or horizontal movement during the act of justifica-

tion; means for enabling the mold-block to engage the said measure-quad and an independent plate on the justifying-plate, for each measure.

6. A measure-quad for use with linotype-matrices in setting tabular matter, its body portion corresponding with the matrices and its edges adapted to project beyond the matrices to engage retaining devices, substantially as described.

7. In combination with a series of linotype-matrices having ears substantially as described, measure-quads of similar form having their ears formed to protrude beyond those of the matrices, whereby they are adapted to coöperate with retaining devices.

8. The combination of a line of matrices composed in measures for tabular work; a measure-quad adapted to act as an abutment between each measure; an abutment at each end of the composed line; means for securing the abutments in position; a space-bar in each measure; and an automatic justifying-plate carrying a spring-supported justifying-plate for each of the said measures.

9. The combination of a line of matrices composed in measures for tabular work; a measure-quad situated between each two adjacent measures to act as an abutment there for them both; means for holding the said measure-quads in their respectively proper positions in the said line while the latter is being justified; an abutment at each end of the composed line separated from its fellow by a distance equal to the standard length of the line; a space-bar in each measure; and means for advancing the space-bars of the respective measures independently.

10. In a linotype-machine, a composed line of matrices, including one or more matrices for producing rules, a mold to coöperate therewith, and means directly engaging the rule-matrices to hold them in predetermined positions against lateral movement, whereby the rule produced on one slug or linotype is caused to register exactly with that on the next.

11. In a linotype-machine, a composed line of matrices, including matrices for producing column-rules transversely on the linotype, means for holding said rule-matrices firmly in predetermined positions, and independently-adjustable spacers between the rule-matrices to effect justification of the various sections or measures in the line.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

WILLIAM FLETCHER.

Witnesses:
CHAS. S. WOODROFFE,
MARK BARR.