

J. S. BANCROFT & M. C. INDAHL.
 AUTOMATIC JUSTIFYING MEANS FOR PATTERN CONTROLLED COMPOSING MACHINES.

980,902.

APPLICATION FILED JULY 13, 1908.

Patented Jan. 10, 1911.

8 SHEETS—SHEET 1.

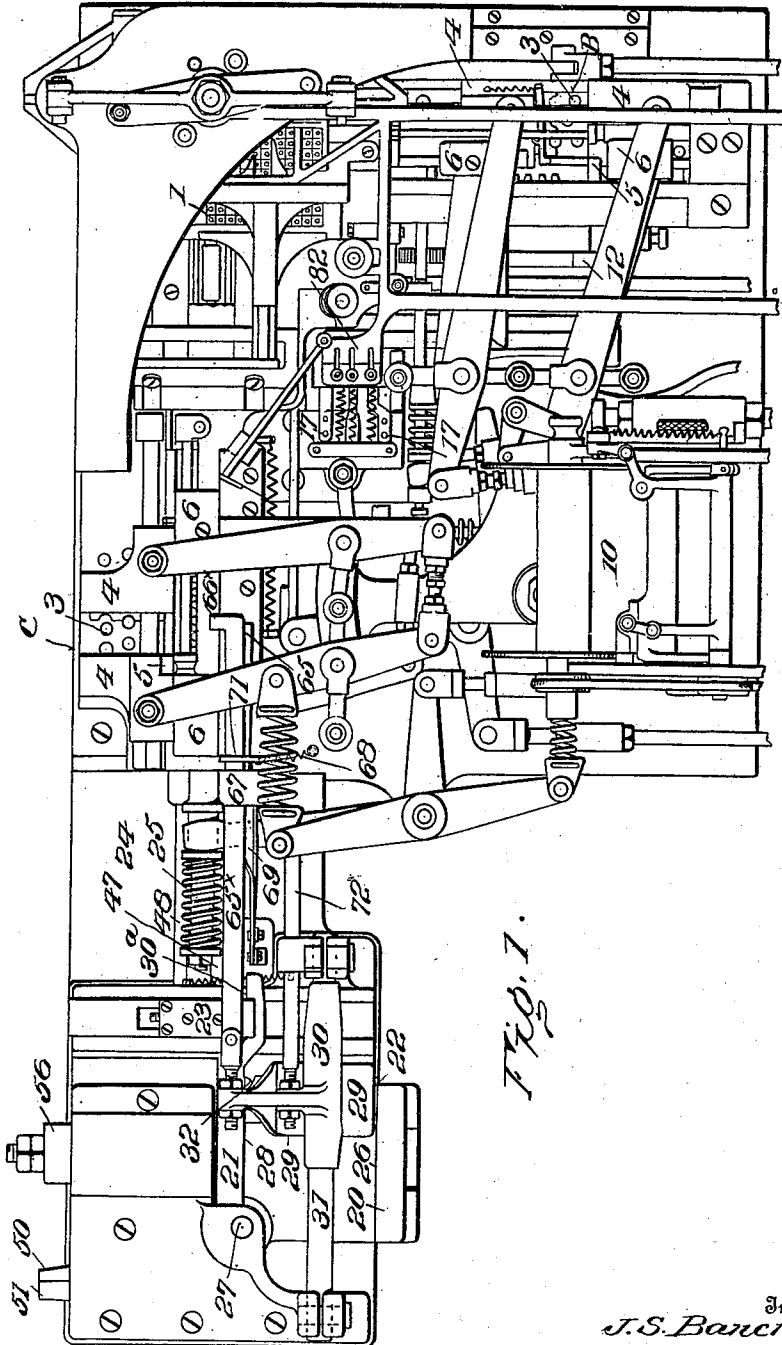


FIG. 1.

Witnesses

Thomas Durant

By

Chas. Clark
 their Attorneys

Inventors
 J. S. Bancroft
 M. C. Indahl

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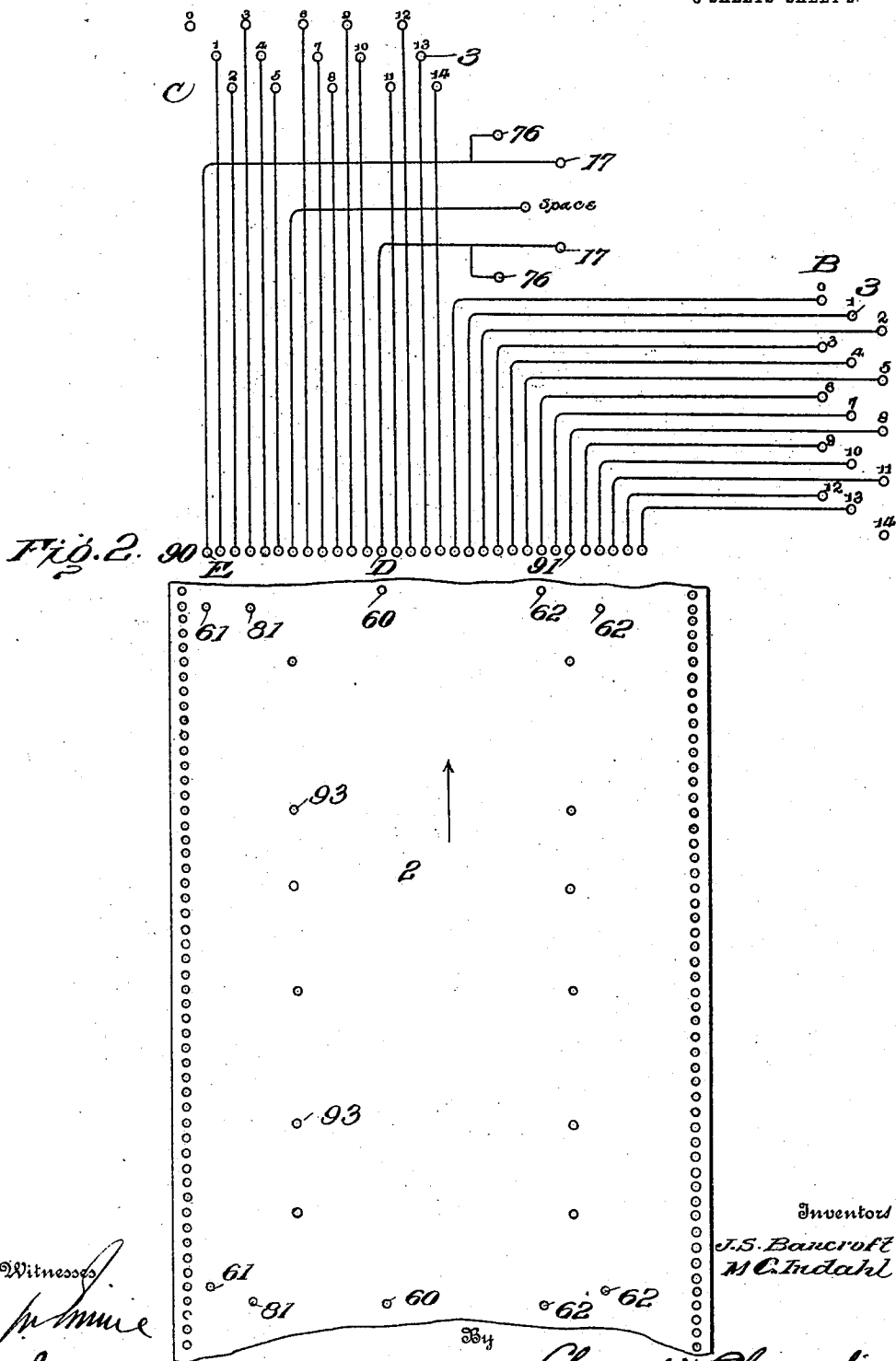


Fig. 2.

Witnesses
Thomas Durant

Inventors
J. S. Bancroft
M. C. Indahl

Clayton & Clayton
 Attorneys

J. S. BANCROFT & M. C. INDAHL.
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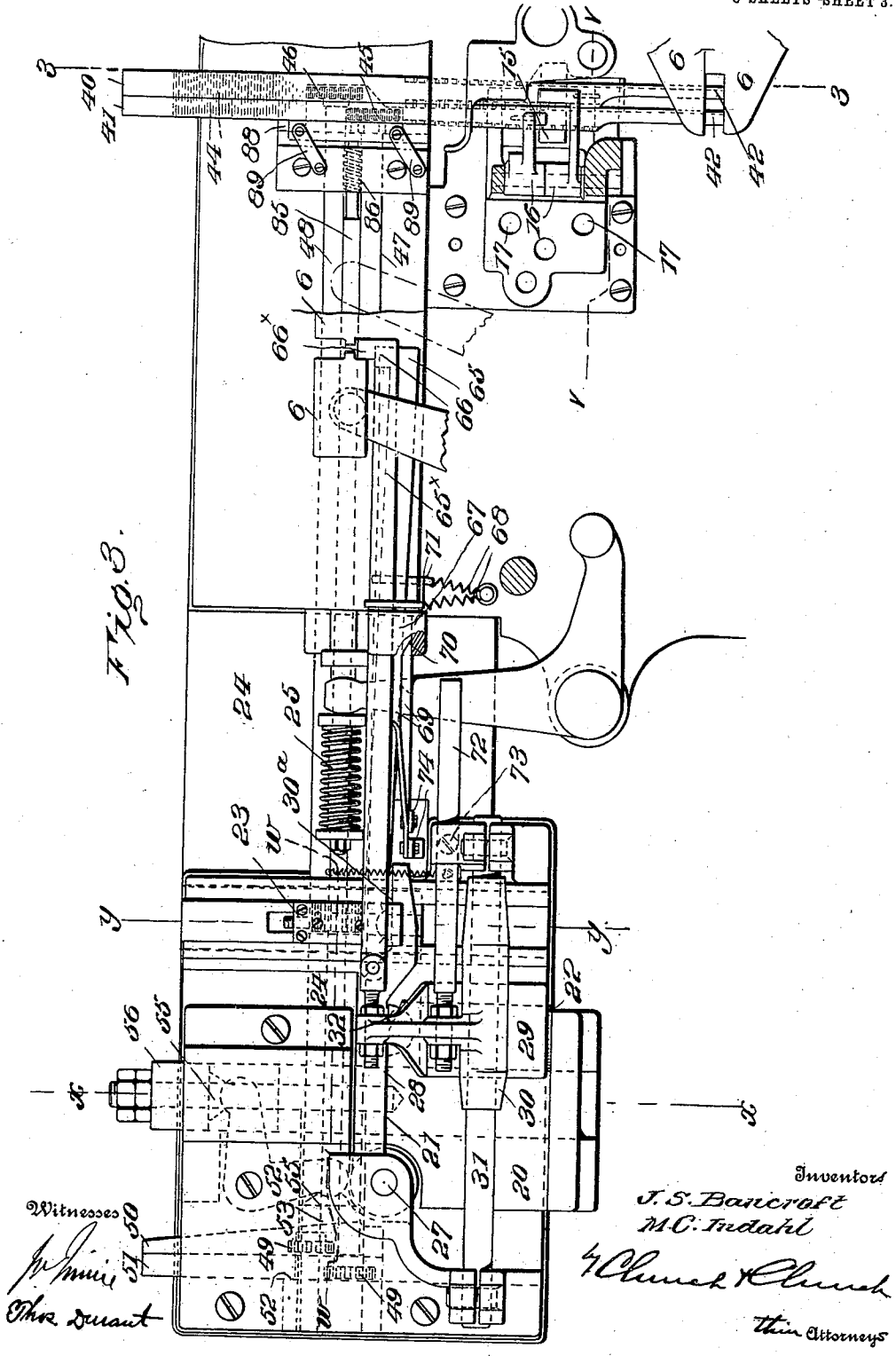


FIG. 3.

Witnesses
W. J. Smith
 Chas. Duant

Inventors
J. S. Bancroft
M. C. Indahl
Chas. Clark
 their Attorneys

J. S. BANCROFT & M. C. INDAHL.
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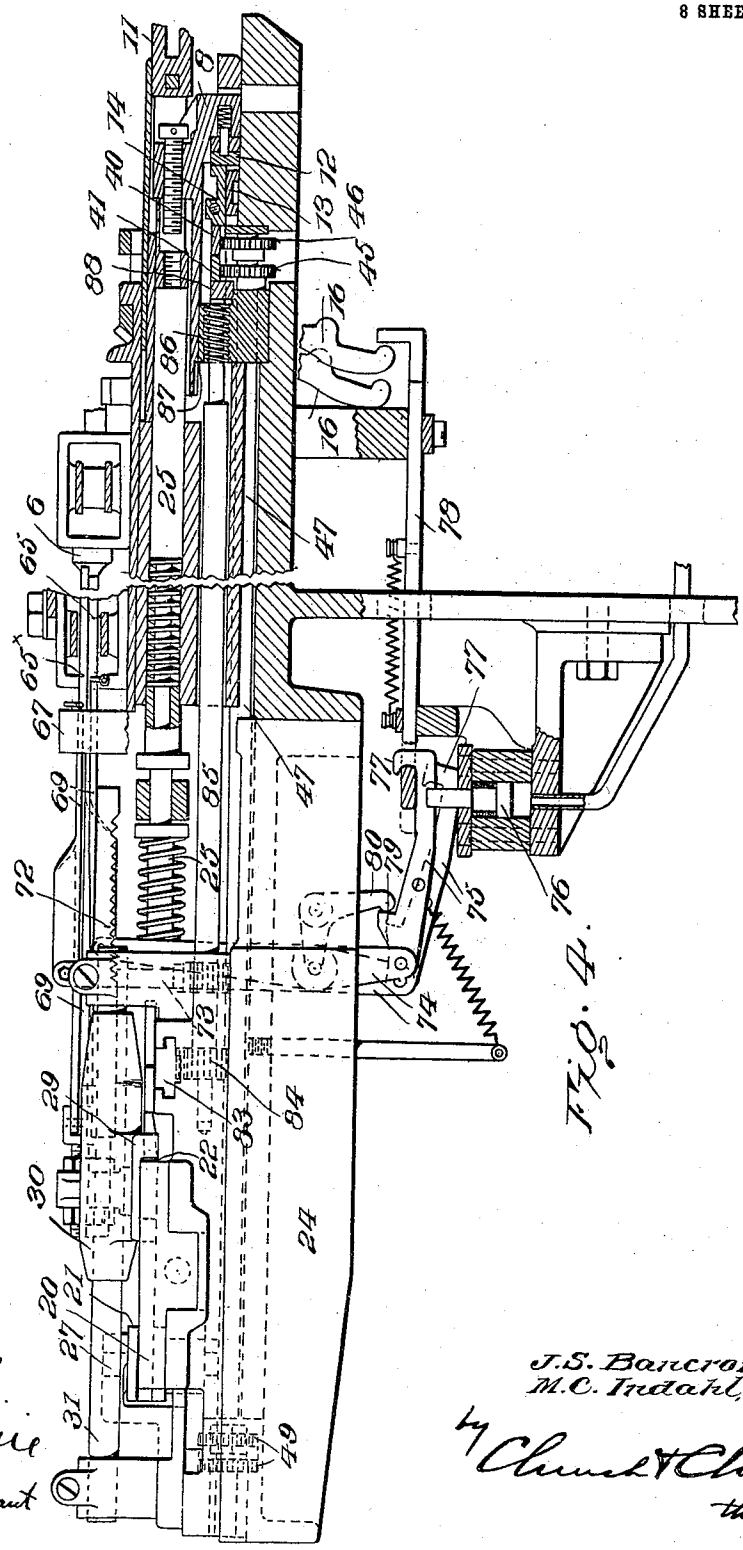
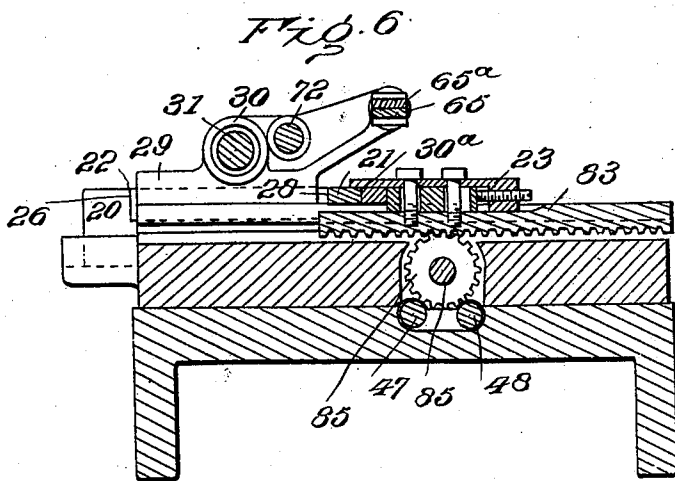
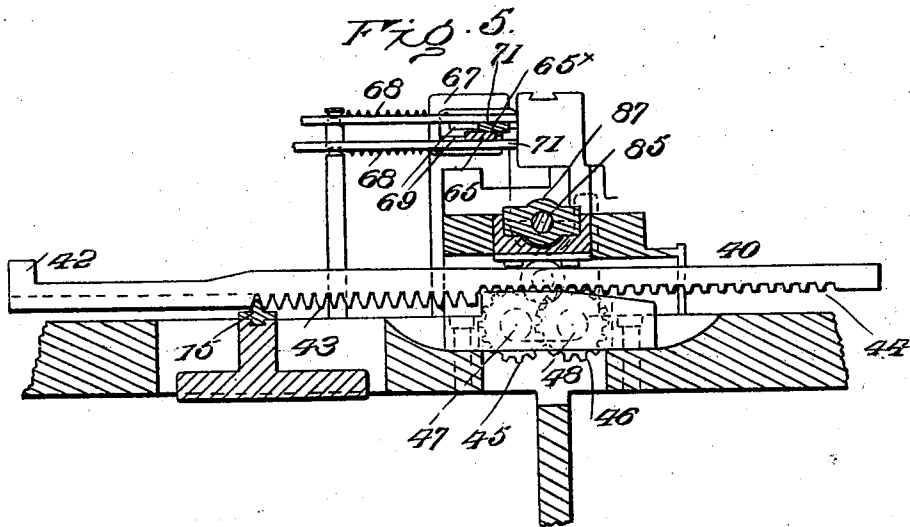


FIG. 4.

Witnesses
J. M. M. M. M.
Chas. Stuart

Inventors
J. S. Bancroft
M. C. Indahl
Chas. & Chas.
 their Attorneys

J. S. BANCROFT & M. C. INDAHL.
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Witnesses

Johnnie
Thomas Durant

Inventors

J. S. Bancroft
M. C. Indahl

By

Chas. H. Clark
Attorneys

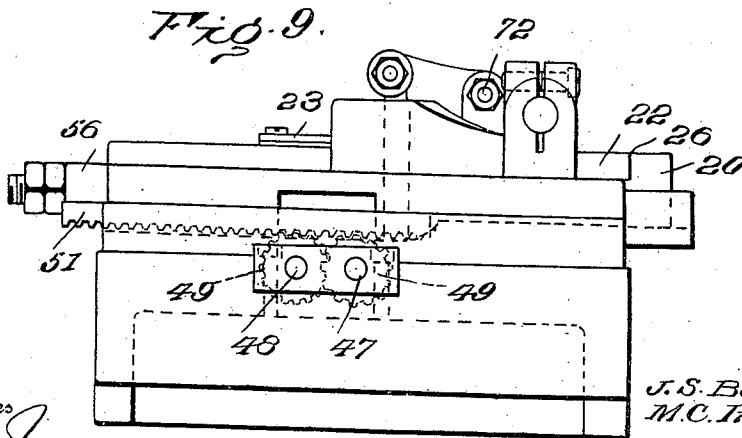
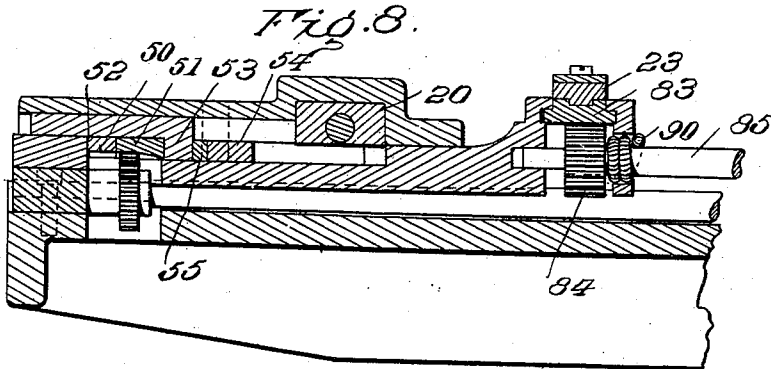
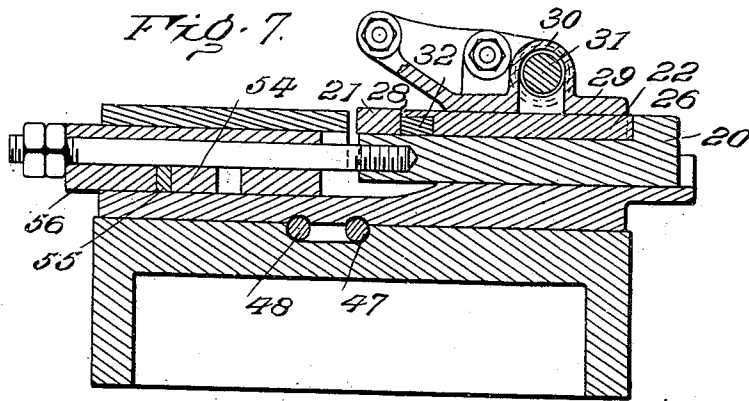
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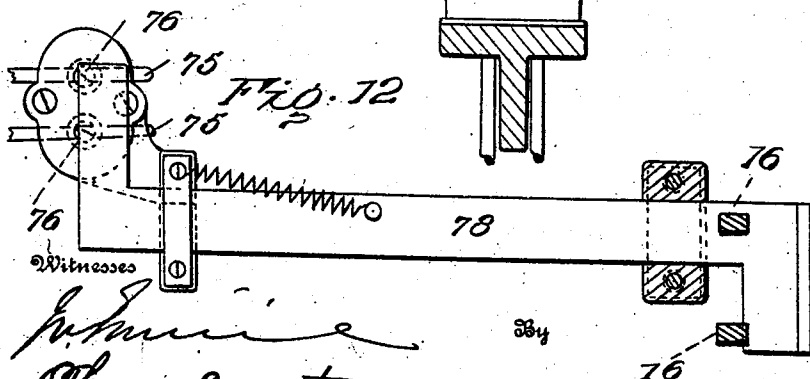
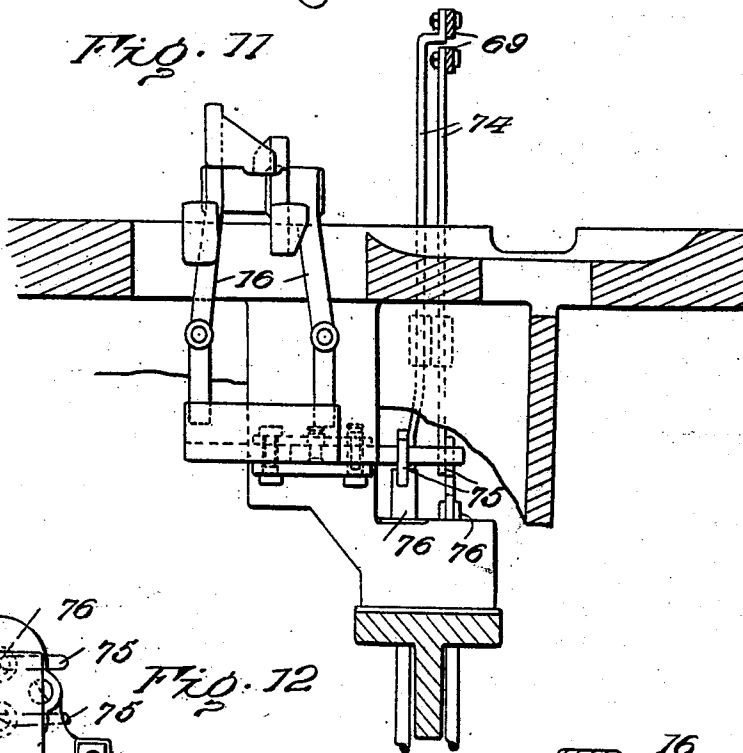
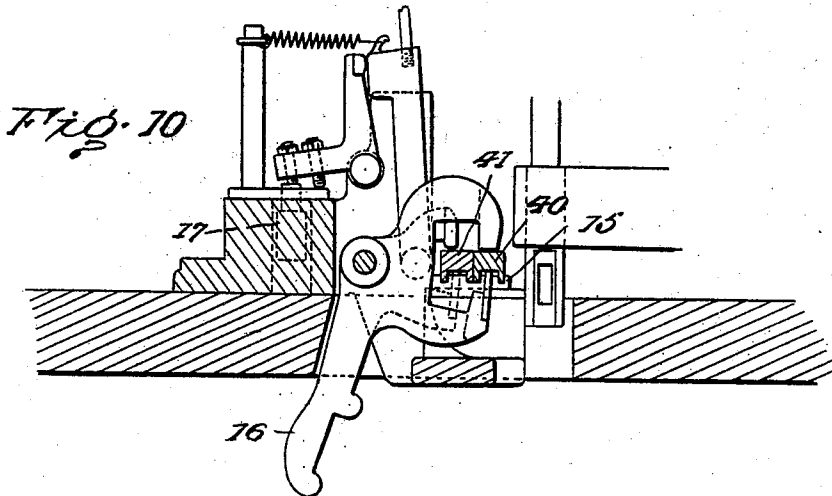
Witnesses

J. M. ...
Chas. Duant

Inventors
 J. S. Bancroft
 M. C. Indahl

Chas. & Chas.
 Their Attorneys

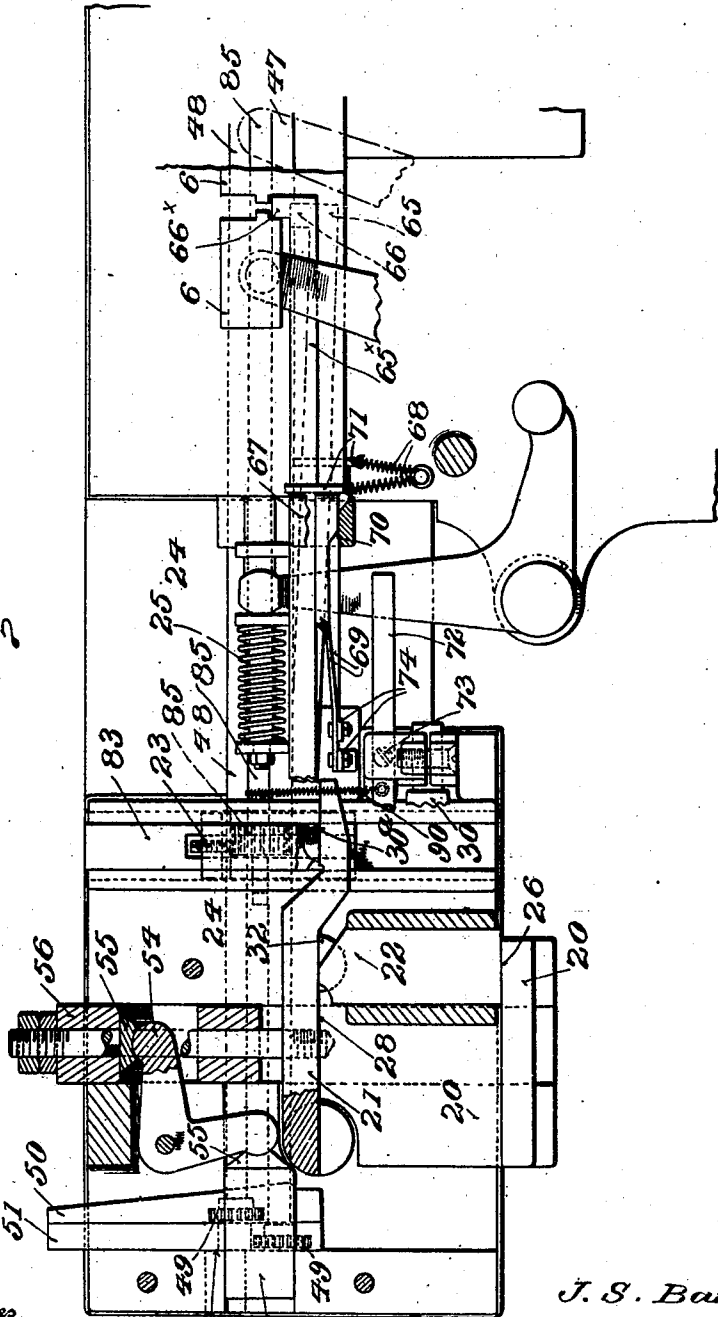
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 980,902. 8 SHEETS—SHEET 7.



Witnesses
Thomas Dewant

Inventors
J. S. Bancroft
M. C. Indahl
 by *Amos Church*
 Attorneys

Fig. 13.



Witnesses
 Thomas Durant
 Alexander Stewart

Inventors
 J. S. Bancroft.
 M. C. Indahl.
 by *Christ & Christ*
 Attorneys

UNITED STATES PATENT OFFICE.

JOHN SELLERS BANCROFT AND MAURITZ C. INDAHL, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNORS TO LANSTON MONOTYPE MACHINE COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF VIRGINIA.

AUTOMATIC JUSTIFYING MEANS FOR PATTERN-CONTROLLED COMPOSING-MACHINES.

980,902.

Specification of Letters Patent. Patented Jan. 10, 1911.

Application filed July 13, 1908. Serial No. 443,247.

To all whom it may concern:

Be it known that we, JOHN SELLERS BANCROFT and MAURITZ C. INDAHL, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a certain new and useful Improvement in Automatic Justifying Means for Pattern-Controlled Composing-Machines; and we do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the figures and letters of reference marked thereon.

This invention relates to the class of composing systems or machines in which a pattern or controller is employed to automatically govern the action of a composing mechanism, the latter adapted and equipped to translate the signals of the pattern into justified lines of typographic matter either in the form of type or type impressions. The pattern or controller employed for this purpose is composed or made up of a succession of individual signals each representing a character, point, space, or operation, and, whatever its form or construction, it is in whole or in part the product of selective action on the part of the compositor in setting up, producing or arranging the signals in the proper sequence. Two distinct and separate composing operations are involved, the one manual, for the production of the pattern, and the other automatic, for the translation of the signals of the pattern into justified lines of character.

Heretofore justification has been performed in connection with the composition of the pattern by associating with each series of signals, designating the characters for a line of composition, a signal or signals representing the dimensions of each justifying space contained in the line, said associated signal or signals, denominated the "justification signal", operating in the automatic composing machine to fix the dimensions of the spaces as produced. An example of such a system is to be found illustrated in Patents Nos. 625,998 of May 30, 1899, and 654,115, of July 17, 1900, wherein an equal distribution of the line deficiency among the spaces is effected by the addition to each series of character and space designating signals, representing a line of composition, a justifica-

tion signal representing the justifying fraction for the line, *i. e.*, the quotient of the line deficiency divided by the total number of justifying spaces represented in the line.

The variety of pattern most commonly employed, and that illustrated in the patents referred to, is a strip or ribbon of flexible material, such as paper, provided with successive signals in the form of perforations variously arranged and combined to represent the individual characters and spaces to be selected and the operations to be performed at the automatic composing machine, the latter being provided with suitable operating devices responsive to the signals or the components thereof. Thus, in the monotype system referred to, a keyboard composing machine (Patent No. 654,115) is employed to produce or set up successive signals, (perforations) representing characters, points, spaces, etc., in the order of composition, which signals, taken together, constitute a pattern of the matter; and, at the end of each series of signals constituting or representing a line, the justification signal appropriate thereto is added, the latter representing the amount to be added to the space type as produced in order to fill out or justify the line. After being thus composed, the pattern or "record strip", as it is called, is fed to the automatic composing machine (Patent No. 625,998) in the reverse order of its composition, so that the justification signal precedes the character signals of each line, said justification signals operating to set appropriate adjusting devices to be thereafter called into action by the space signals of the line.

Various means have been proposed for indicating the justification fraction or the signal producing devices corresponding therewith, and for producing or applying the signal thus indicated upon the pattern in conjunction with the series of signals representing the line of composition with which it is associated, but the method universally adopted commercially, up to the present time, is the one disclosed in Patent No. 654,115, wherein the keyboard composing machine is provided with automatic means for indicating to the operator the appropriate justification signal, so that after the signals for the line have all been composed or set up he is advised which key or keys should

be manipulated to produce the proper justification signal. The production of these justification signals not only serves to distract the attention of the operator from his copy, and otherwise consume valuable time, but presents a fruitful source of error due to faulty observation or selection, tending to diminish the producing capacity of the automatic composing machine, more especially where the latter is equipped with means for automatically arresting its action upon the presentation of improperly or incompletely justified lines. Numerous attempts have been made to overcome these objectionable features by providing the pattern composing mechanism with automatic means for distributing the line shortage and selecting the signal producing devices corresponding with the indicated fraction; but so far no commercially practical embodiment has been devised or produced, owing, in part at least, to the extreme degree of accuracy demanded, the complexity and delicacy of the mechanism, the lack of endurance under commercial conditions of use and the interference with the other pattern composing functions.

Now the primary object of the present invention is the automatic justification of the produced lines of characters by transferring the justification function, *i. e.*, the division and distribution of line deficiency among the spaces, from the pattern composing to the automatic composing machine, to accomplish which the present justification signals are entirely omitted in the pattern or record strip, and in lieu thereof signals representing the deficiency of the line and number of justifying spaces contained therein are supplied, and in addition thereto the automatic composing machine is equipped with dimensioning devices controlled by said line-deficiency and space-number signals and operating to automatically apportion and distribute the indicated line deficiency among the indicated number of spaces as the latter are produced.

To this end the invention consists, broadly, first, in providing the pattern, record strip or controller of an automatic composing machine with line measuring and space number signals; second, in providing the final or automatic composing machine with a shortage distributing or apportioning system or mechanism controlled by the space-number and line deficiency signals of the pattern and operating to automatically adjust the space dimensioning devices so as to produce spaces of proper dimensions to justify or fill out the line; and, third, in the several minor combinations, arrangements and constructions of parts as hereinafter fully described, the novel features being pointed out in the claims.

In the accompanying drawings illustrat-

ing a preferred form of embodiment of the invention: Figure 1 is a top plan view of a type casting and composing machine with the improvements shown applied thereto. Fig. 2 is a plan view of a section of the preliminary representation device or record strip containing the space distributing signals together with a diagrammatic representation of the pneumatic system of communication. Fig. 3 is a top plan view of the proportional divider attachment, shown on an enlarged scale. Fig. 4 is a side elevation partly in section of the attachment, Fig. 3. Fig. 5 is a transverse section on the line 3-3, Fig. 3. Fig. 6 is a transverse section on the line $y-y$, Fig. 3. Fig. 7 is a transverse section on the line $x-x$, Fig. 3. Fig. 8 is a transverse section on the line $w-w$, Fig. 3. Fig. 9 is an end elevation of the attachment. Fig. 10 is a vertical section on the line $v-v$, Fig. 3. Fig. 11 is a front elevation of the lifter jaws and connections for the space registering devices. Fig. 12 is a top plan view of the connection between the lifter jaws and selecting members of the space registering devices. Fig. 13 is a top plan view partly in section of a portion of the mechanism represented in Fig. 3, the connections for shifting the interponent being omitted to uncover the deficiency registering, translating and space determining components.

Like numerals in the several figures designate corresponding parts.

Although in its main features applicable to other forms of automatic pattern controlled composing machines, the invention is here illustrated in connection with the automatic composing mechanism of Patent No. 625,998, dated May 30, 1899, to which latter reference is made for the details of construction and mode of operation.

It will suffice for present purposes to designate some of the principal elements with which the improvements are more or less directly associated, and to indicate the changes or omissions rendered necessary thereby.

The die case 1, supported to reciprocate on transverse intersecting lines above the mold (not shown) is connected to a centering mechanism including two adjusting or positioning systems independently controlled by the signals of the pattern or record strip 2, and acting, the one upon the die-case, and the other upon its carrier, to center the selected matrix above the mold by a two way movement of the die-case. As organized, each of said adjusting or positioning mechanisms includes the following elements, viz: a primary gage in the form of a plurality of stop pins 3 serially disposed and individually controlled by signals (perforations) in the record strip; a primary positioning mechanism in the form of oppo-

sitely movable jaws 4; a secondary gage or stop-bar 5 which is moved to position by jaws 4 and there locked; and a secondary or final positioning mechanism represented by oppositely movable jaws 6 closing on the stop bar 5 and coupled with either the die-case or its carrier for shifting the latter to the position indicated by one of the stop pins 3. The perforated record strip or primary representation 2 is advanced by a paper feed mechanism 10 to present successive signals (perforations) to a tracker board or bar 90, the latter provided with a series of ports 91, Fig. 2, each communicating with one or more of the various pneumatically operated control members, including stop-pins 3.

The mold is equipped with a movable mold-blade 11 (of which the rear section only is shown, Fig. 4) for varying the width of the mold cavity to correspond with the character represented by the centered matrix, the position of said mold-blade being determined by its engagement with a movable abutment 8. It will thus be seen that the position of this abutment 8 at the time the mold blade is brought into contact therewith determines the width of the type to be cast in the mold; but inasmuch as the dimensions of some of the type, such as characters, points, quads, etc., are fixed and constant for each set, while others, such as the justifying spaces, are variable, additional adjusting means are provided for the latter. In the machine of the patent a normal wedge 12, Fig. 4, two justifying wedges (now dispensed with) and two transfer blocks 13, 14, are employed for this purpose. The normal wedge 12, interposed between transfer block 13 and abutment 8, is so connected with one of the final positioning mechanisms 6 as to partake of the movements of the die case in one direction, and thus position the abutment to correspond with the column containing the selected matrix; or it may be provided with independent positioning means separately controlled by the record strip, as illustrated in Patent No. 770,253, of September 20, 1904; but in either case the normal wedge, and consequently the abutment 8 is given a definite position corresponding with the predetermined width-value of each matrix brought to the centering point. The two justification wedges were formerly arranged in series with the normal wedge and transfer block 14, and operated in conjunction with the normal wedge to vary the position of the abutment 8 according to their setting.

The justification wedges were positioned, preliminary to the formation of the types for each line, by the justification signals in the record strip; transfer block 13 stood normally in engagement with the normal wedge, with transfer block 14 retracted, so

that the normal wedge alone acted upon the abutment 8; and each justification space signal operated to reverse the positions of the two transfer blocks, thereby bringing into action the justifying wedges, to control the dimensions of said justifying spaces. Each justification wedge rested upon a retaining gage 15 and extended between the arms of one of a pair of shifting levers 16 in position to be moved by the latter into engagement with one of the final positioning mechanisms 6 for adjustment and subsequent deposit upon its restraining gage.

The justification signal contained two components (perforations) the one a designating element for the wedges, and operating through one of two pistons 17 to connect one or the other of the levers 16 to a moving portion of the machine, thereby coupling the selected wedge with the positioning devices, and the other a dimensioning element operating through a stop pin 3 to determine the movement of said positioning devices. From the foregoing brief outline it is apparent that in this instance, the justification signals represented the pre-calculated dimensions of the justifying spaces required to fill the line, *i. e.*, the quotient of the line deficiency divided by the number of spaces, and that said signals were translated directly into dimensioning adjustments through the medium of the justification wedges, their set value being added to that of the normal wedge.

In the present adaptation the justification wedges are replaced functionally by what is denominated a shortage distributing or apportioning attachment, that is, a mechanism controlled by signals representing line-deficiency and number of justifying spaces, instead of precalculated space dimensions and operating to automatically effect a division of the line deficiency by the number of justifying spaces, and to set the mold-blade abutment to correspond with the quotient, thereby transferring the space distributing function from the manual or pattern composing to the automatic or final composing operations, and eliminating errors occasioned by faulty observation or action on the part of the compositor. The preferred form of attachment illustrated is specially adapted to perform this function and embraces three principal cooperating elements, to wit; means controlled by the line deficiency signal for registering the line deficiency; means controlled by the space number signal for translating the indicated and registered line deficiency into the quotient of the latter divided by the number of spaces; and means for rendering said ascertained quotient operative upon the space adjusting, determining or selecting devices of the final composing mechanism.

As here shown, the line deficiency regis-

tering component is represented by a slide 20; the translating component by radius bar 21 and interponent 22; and the quotient or space determining component by a slide 5 23 coupled with the radius bar 21 and acting indirectly upon the mold-blade abutment 8 to vary its position, all as will presently appear.

The deficiency registering component or 10 slide 20 is mounted to reciprocate in a right line upon an extension 24 of the main frame in rear of the rod 25 through which motion is given the mold-blade 11, and said slide is 15 equipped with a straight edge 26 disposed in a plane at right angles to its line of motion, which straight edge, by the movement communicated to the slide, measures the line deficiency.

The radius bar 21 of the translating component is pivoted on an axis 27 perpendicular to the plane of movement of slide 20 and is provided with a straight edge 28 radial to said axis and normally parallel with the 25 straight edge 26. Between said straight edges is arranged the interponent 22 supported to reciprocate both in parallel with slide 20 and at right angles thereto by means of a shoe 29 provided with ways for the interponent and with a sleeve 30 inclosing a 30 fixed guide rod 31. The interponent 22 is also provided with a pivotal bearing block 32 engaging straight edge 28 of the radius bar.

With slide 20 in its retracted or zero position, Fig. 3, indicating no line deficiency, 35 straight edges 26 and 28 will be retained in parallel by the interponent 22 in any position of adjustment of shoe 29; but if slide 20 is advanced longitudinally a distance 40 equal or proportional to the line deficiency it will permit radius bar 21 to swing on its axis and present its straight edge 28 at an angle to the straight edge 26.

The degree of angular displacement of 45 the radius bar will be in proportion to the movement of straight edge 26 as modified by the position of the interponent 22; that is to say, the lateral motion permitted radius bar 20 will equal the interval between said bar 50 and straight edge 26 measured on a tangent drawn longitudinally through the center of said interponent, minus the length of the latter between its points of contact with said radius bar and straight edge; and for 55 any given movement of slide 20 the angular displacement of the radius bar will diminish in proportion to the distance of the interponent from the axis of said bar. Radius bar 21 is furnished with a second 60 straight edge 30^a facing in the opposite direction but forming a prolongation of straight edge 28.

The quotient or space determining component or slide 23 is guided on the frame to 65 move in a line parallel with the movement of

interponent 22 in its shoe 29, and it is furnished with a swivel shoe engaging straight edge 30^a so that its motion will be tangent to the arc traversed by the radius bar at the point of contact of shoe 29 therewith. 70

The arrangement of the parts thus far described is such that with the interponent 22 located at any point to one side of the axis of radius bar 21, any departure of slide 20 from the zero position will effect a move- 75 ment of slide 23 corresponding to or proportional to the space value or number of units represented by the movement of said slide 20; and by shifting the interponent laterally of straight edge 26 through successive intervals of uniform extent corresponding with 80 the initial displacement from the axis of the radius bar, the movement thus communicated to slide 23, will be correspondingly varied to represent $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$, and so on of 85 the total movement or measure resulting from the displacement of slide 20, and thus the measured or registered line deficiency will be automatically translated into movements of slide 23 corresponding with the 90 quotient of the line deficiency divided by the number of space type, the latter represented by the number of units the interponent is removed from the axis of radius bar 21. The initial or zero position of interponent 95 22 on radius bar 21 may be opposite or one unit removed from the axis of said radius bar, as preferred or deemed expedient.

It remains to explain how the signals at the end of each line of pattern composition 100 exercise control over the line deficiency measuring or indicating slide 20 and the space-number interponent 22 of the translating devices, and how the quotient slide 23 is coupled with the mold adjusting devices 105 in the present adaptation, it being understood, of course, that said means must be varied to suit and accommodate different varieties of composing machines. First as 110 to the means for adjusting the slide 20. For convenience, and as better adapted to the organization of the present commercial form of final composing machine shown, the unit of measurement for line deficiency corresponds with or closely approximates the 115 unit of the set, say, for example .00333+ inch for pica, although any other unit of measurement may be adopted suited to the capacity of the machine. The two justifying 120 wedges of the prior machine are replaced by two parallel-sided bars 40, 41, each received between the jaws of one of the levers 16 and provided with a projection 42, adapted to be engaged by the final positioning jaws 6 when the bar is elevated by its 125 lever 16, and with a series of notches 43 for engaging the retaining gage 15 when the bar is deposited out of the range of jaws 6 after adjustment to the position indicated by one of the stop pins 3. In addition, each bar 40, 130

41, is provided with rack teeth 44 engaging a pinion 45 or 46 on a shaft 47 or 48. Shafts 47, 48, are each provided with a pinion 49 engaging teeth on the underside of one of a pair of wedges 50, 51, arranged side by side between a fixed abutment 52 on the frame and a block 53, the latter movable in guides on the frame in a direction transverse of the wedges. On the frame is mounted a bell-crank lever 54 one arm whereof connects through a pivotal shoe 55 with block 53 and the other arm through a similar shoe 55, with an adjustable block 56 carried by slide 20. In the example the two wedges differ in taper in the proportion of fifteen to one per unit of adjustment, that is to say, the wedge 51 is given a taper of .00333+ inch and the wedge 50 a taper of .05 inch per unit of longitudinal adjustment.

By reference to Fig. 2 it will be seen that each signal preceding the signals or perforations constituting the pattern of a line of matter is composed of two sets of perforations, each set including a designating perforation 60 or 61 and a dimensioning or measuring perforation 62, and, in addition, a selecting perforation 81 associated with one or the other sets of perforations. In the example given the first signal or that nearest the tracker bar represents a line shortage of 100 units and six spaces, while the second represents the same shortage and seven spaces. The series of pins 3 which control the position of slide 20 is lettered B, and the series controlling interponent 22 is lettered C in Fig. 2, and the pins of each series are numbered consecutively from 0 to 14 corresponding to the zero positions and successive stages of adjustment of said slide and interponent respectively. The designating perforations 60, 61, register respectively with the ports D, E, of the tracker bar, the port D controlling piston 17 of the lever 16 engaging bar 40, while port E controls the piston of the lever 16 engaging bar 41, so that accordingly as a perforation 60 or 61 is presented the corresponding bar 40 or 41 will be connected to a moving part of the machine (after the manner of the justification wedges of the prior machine) to elevate the bar thus selected into the path of the final positioning jaws and thus render operative the dimensioning component 62 associated therewith and operating to determine the stage of adjustment to be applied to the selected bar. Thus, the designating perforation 60, in the example given, is associated with a dimensioning perforation 62, corresponding with the sixth of the B series of pins 3, and the designating perforation 61 with a dimensioning perforation 62 corresponding with the tenth pin 3, so that as the record strip is fed to the machine in the direction indicated by the arrow, bar 40 will first be elevated and moved to the sixth posi-

tion and then deposited on its gage, after which bar 41 will be in like manner elevated and moved to the tenth position. The effect will be to set wedges 50, 51, at the sixth and tenth positions of adjustment, respectively, thus indicating a measure of $6 \times 15 = 90$ units at wedge 50, and 10 units at wedge 51 or a total of 100 units at slide 20.

As the arrangement illustrated contemplates that when slide 20 is retracted to its zero position, corresponding with no shortage in the line, both wedges 50, 51, shall be included and in an extreme position, with their widest portions interposed between the abutment 53 and slide 52, it follows that the zero pin of the series 3 controlling the positions of bars 40, 41, will be brought into action, to set the wedges, when the line comes out even, hence in such contingency the signal at the beginning of the line will include the two designating perforations each associated with a dimensioning perforation 62 corresponding with the zero pin of the B series. It is obvious, however, that the zero position of the wedges 50, 51, might be transposed to the fifteenth or fixed pin 14 of the B series (equivalent to the omission of a dimensioning perforation). Owing to the fact that in the machine to which the invention is shown applied slides 40, 41, retain the positions to which set until changed by subsequent designating and dimensioning perforations 60, 61, and 62 (or what is the equivalent of a dimensioning perforation 62 the omission of a perforation in that series) it is required that a line which happens to come out even, hence does not require justification, should be ended by a signal operating to set the two wedges to bring the slide 20 to zero position, a condition which would not exist if the adjusting devices which measure the line shortage were given a normal or zero position at the conclusion of each line and the dimensioning component operated to measure the excursions from the datum line thus provided. It is clear, therefore, that by varying the positions of the dimensioning perforations 62, thereby bringing into action different pins of the B series, the slide 20 can be set or adjusted to represent any line deficiency within the capacity of the wedges 50, 51, either in units of the set or otherwise according to the taper of the wedges. Next, as to the mechanism for setting the interponent 22 in accordance with the number of justifying spaces in the line. The final positioning jaws 6 of the adjusting system complementary to that operating upon bars 40, 41, is utilized for this purpose, the C series of stop pins 3 for determining the closed positions of said jaws serving to designate successive stages of adjustment. With this end in view shoe 29 is provided with a pivoted latch or bar 65 provided

with a head or projection 66 adapted to be moved into and withdrawn from the path of said jaws. But fourteen stages of adjustment are afforded by pins 3, the arrangement being such that the interponent will stand in line with the axis of radius bar 21 when brought to the position indicated by the zero or fixed stop pin of series C and as it frequently happens that the line contains a larger number of spaces, whose dimensions it is desired to increase by justification, means are provided whereby the number of stations can be doubled without changing the number of pins 3. To this end the shoe 29 is equipped with a second latch or bar 65* whose head 66* is displaced, as compared with the corresponding head of latch 65, by an amount equal to one half the interval between successive pins 3, so that accordingly as the one or the other of said latches is engaged the interponent will be moved to or within one half interval of the pin acting at the time to designate the closed position of jaws 6, it being understood, of course, that in such event the initial displacement of the interponent on radius bar 21 will be calculated at $\frac{1}{2}$ the amount required when one latch only is employed.

The latches 65, 65* are arranged one above the other in a guide 67, and extending through said guide in front of the latches are two bars 69 each provided with an incline 70 and a guide 71 to which latter is coupled a retracting spring 68. When the bars 69 are in retracted or normal position their inclines are in such relation to the guide 67 that the latches are withdrawn from the path of jaws 6 by the springs 68; but when either bar 69 is moved longitudinally, its incline 70 will engage the guide 67 and press the corresponding latch forward into the path of the jaws. It may here be remarked that shoe 29 carries a notched bar 72 in position to be engaged by a spring actuated bolt 73, to hold the shoe and interponent in adjusted position.

Each latch actuating bar 69 is connected to a lever 74 pivoted to the frame and provided with a link 75 opposite one of a pair of pistons 76. The links 75 are each equipped with a hook 77 adapted when the link is elevated by its piston, to engage bar 78 extending in front of the levers 16 acting upon bars 40, 41. Each link 75 is also furnished with a shoulder 79 in position to engage a lever 80, the latter connected with bolt 73, to retract the latter against its spring whenever either lever 74 is operated upon.

The cylinder of one piston 76 is in communication with the port D controlled by the designating perforation 60 and the cylinder of the other with the port E of the designating perforation 61 so that whenever a signal containing either designating per-

foration 60 or 61 is presented, one or the other of the pistons 76 will be actuated to elevate its link 75 and thereby retract locking bolt 73 and present hook 77 in front of bar 78. This selective elevation of the links 75 by the designating perforations 60, 61, is for the purpose of determining which of the latches 65, 65* is to be acted upon by the final positioning jaws 6, the closed position whereof is determined by a space-number perforation 81 controlling one of the C series of stop pins 3 associated with one or the other of the designating perforations 60, 61.

If the machine is equipped to deal with but fourteen justifying spaces, the parts being correspondingly proportioned, but one latch 65, bar 69, link 75 and piston 76 will be required, and the perforation 81 corresponding in position with the port of that one of the stop pins 3 of the same numerical value will be associated with that one of the designating perforations 60 or 61 controlling the retained piston, so that the interponent will be coupled up and carried to the position corresponding with that of the pin 3 brought into action by perforation 81; but when the machine is equipped to deal with a number of spaces greater than the number of pins in the series 3, and the two latches 65, 65* are employed for the purpose, one of said latches—65 for example—will be brought into action to designate the odd number, and the other—65*—to designate the even number spaces, the selection being accomplished by the association of the numbering perforation 81 with either of the designating perforations 60, 61, selected for the purpose. Thus if a single latch 65 is employed and its controlling piston 76 is connected with the port governed by designating perforation 60, it will only be necessary to associate with the signal containing said designating perforation 60, a perforation corresponding with that one in the series of pins 3 representing the number of spaces. For example, if there are six spaces in the line a perforation controlling the sixth in the C series of pins 3 would be employed, and if seven spaces a perforation corresponding with the seventh pin, and so on. When, however, the machine is arranged as shown to deal with a larger number of spaces, and for that purpose is equipped with a supplemental latch 65* whose head 66* is set to one side of that of latch 65, an amount equal to one half the distance between successive pins 3, the numerical value of each pin will be increased and determined by that one of the latches 65, 65* at the time engaged. Thus, for example, if latch 65* when positioned by the zero or fixed pin of series C locates the interponent 22 opposite the pivot of radius bar 21, latch 65, if used in connection with the same pin will locate

the interponent one unit removed from said axis, corresponding with one space, and the radius bar will swing an amount equal or proportional to the displacement of slide 20; if, however, pin No. 1 is employed, latch 65* will locate the interponent at two units and latch 65 at three units removed from said axis; pin No. 2 with latch 65* will locate it at four units and latch 65 at five units, and so on throughout the series. It is apparent, therefore, that each pin 3 of the C series save the zero pin is accorded two consecutive space-number values in the series, and that latches 65, 65*, serve to designate successive odd and even numbers.

As both designating perforations 60, 61, are operative upon the latches it is important that the perforation 81 should be associated with that one immediately preceding the signals for the character of the line, in order that the setting effected may not be wiped out or canceled by a succeeding designating signal 60 or 61; and this is readily accomplished by varying the order of the two signals containing said designating perforations. In the example, illustrated in Fig. 2, the first signal wherein the designating perforation 61 with which is associated the space-number perforation 81 for six spaces is placed after the signal containing the designating perforation 60 (perforation 81 representing the third of the space number series of pins 3 and perforation 61 designating latch 65*) and, as a result, interponent 22 will be moved six units and there retained during the formation of the line which it heads; but in the succeeding seven space signal pertaining to the next succeeding line the positions of designating perforations 60, 61, are reversed, the perforation 81 (representing the third of the space number series in pins 3) being associated with perforation 60 to bring into action latch 65 and move the interponent to the seventh position.

It so happens that in the final composing machine illustrated the primary gages or stop pins 3 are set while the final positioning devices or jaws 6 are in closed or adjusted position, and during the opening movement of said jaws 6 the primary positioning jaws 4 are closed, to position the secondary gages or stop bars 5, so that on the next closing movement of jaws 6 the parts adjusted thereby will be brought to the position designated by pins 3. Accordingly where dimensioning and designating perforations are thus associated together in the same signal, means must be provided for delaying or suspending the action of the designating component until the dimensioning component of the signal becomes effective. In the case of the bars 40, 41, this is accomplished in the same way as it was with the justifying wedges of the prior

structure, that is to say, by causing the designating perforations 60, 61, to operate through pistons 17 to connect levers 16 with the centering pin actuating lever 82, Fig. 1, so that while jaws 6 are closed levers 16 will be tilted and thus retained by engagement with lever 82, during the succeeding opening and closing movements of said jaws 6, thereby prolonging the effect of the designating component (perforation 60 or 61) until the dimensioning component (perforation 62) becomes effective. Advantage is taken of this mechanism for rendering the space number components 81 operative when associated with designating components 60, 61, to which end the links 75 controlled by pistons 76 responding to said designating perforations (60, 61) are arranged to be coupled with the levers 16 (likewise controlled by said designating perforations) through bar 78, the arrangement being such that the selected link will be elevated into the path of the bar and so held when actuating lever 82 is moved to tilt the designated lever 16. The hook 77 assists in retaining the link in engagement with bar 78 until the latter is retracted by its spring, which movement does not take place until after the final positioning jaws 6 have closed upon the stop bar in the position indicated by the space number perforation 81.

As hereinbefore explained the quotient slide 23 is set, at the beginning of each line, by the line-deficiency and space-number signals to a position representing the quotient of the indicated line deficiency divided by the number of spaces, the amount of displacement measured from a zero or datum line being equal or proportional to the size of or the addition to the space type in order to absorb the line deficiency and thus justify or fill out the line. In the present instance the indicated displacement of slide 23 is proportional to the amount of addition, inasmuch as the space type is given a certain normal dimension by the normal wedge which dimension is varied by slide 23, as will now be explained.

Slide 23 is adjustably connected with a rack 83 (Figs. 1, 4, 6 and 8) supported in guides and engaging a pinion 84 on shaft 85. This shaft is supported to move longitudinally in its bearings and provided with a screw 86 engaging a threaded orifice in a block 87 fast on the frame. The end of shaft 85 engages a block 88 supported upon parallel links 89 or otherwise guided. Block 88 constitutes the abutment for transfer block 14, the latter acting upon it through slides 40, 41, which are interposed at this point merely as a matter of accommodation to existing relations of parts. When slide 23 is in register with its datum line, which occurs when the straight edge of the radius

bar is in parallel with that of slide 20, abutment block 88 occupies its zero position and the spaces are dimensioned by the normal wedge, subject, however, to such variation as
 5 may be effected by the adjustment of rack 83 relative to slide 23, and any displacement of said slide through the action of slide 20, radius bar 21 and interponent 22, will effect
 10 a proportional recession of abutment slides 88 and 8 and mold blade 11, resulting in a corresponding enlargement of the mold cavity and of the type cast therein. A motor device represented by spring 90 is coupled with shaft 85 and operates to turn the latter
 15 in a direction to maintain slide 23 in contact with the radius bar and the interponent against the straight edge on slide 20.

Operation: The pattern or record strip having been prepared or set-up with signals
 20 representing the deficiency of the line and the number of justifying spaces contained therein, preceding each series of signals representing individual characters, points, spaces, etc., composing the lines, it is fed to
 25 the final composing machine. The designating component (perforations 60 or 61) first presented couples up one of the wedges 50, 51, of the line deficiency measuring device (slide 20) and the corresponding latch 65, or 65*, of the dividing mechanism, while the
 30 dimensioning component (perforation 62) sets a pin 3 of the B series to determine the position of the wedge 50 or 51. Thereupon the wedge 50 or 51 is moved to and locked in the predetermined position, and, at the
 35 same time, interponent 22 is shifted to the extreme position designated by the fixed pin of the C series connected with said interponent, or to an intermediate position such as may be designated by a perforation
 40 81. The next designating perforation (60 or 61) presented in like manner couples the other wedge (50 or 51) and moves it to the position indicated by the pin 3 responding to the dimensioning perforation 62, thereby
 45 completing the adjustment of the line deficiency measuring slide 20, at the same time coupling the corresponding interponent latch 65 or 65* with adjusting system and
 50 shifting interponent 22 to the position determined by the associated perforation 81. As a result, the slide 20 is adjusted in accordance with the line deficiency indicated by perforations 62, and the interponent is
 55 set to correspond with the number of spaces indicated by perforation 81. During this shifting of wedges 50, 51, and interponent 22, slide 23 has followed the movements of the radius or dividing bar 21 and has finally
 60 brought the abutment 88 to a position representing the quotient of the indicated line deficiency divided by the indicated number of spaces. While this setting of abutment 88 is taking place no type are cast, the pump
 65 being locked out in the same manner and by

means heretofore employed when setting the justifying wedges. The type signals operate as heretofore through pins 3 of both series to center the die case and shift the normal
 70 wedge, the transfer block 13 being in position to couple the normal wedge with the mold-blade abutment 8 and thus dimension the mold. When, however, a space signal 93 is presented it operates, as heretofore, to reverse the positions of the transfer blocks,
 75 thus bringing transfer block 14 into action, whereby the abutment slide 88 (previously adjusted to correspond with the amount to be added to the normal space dimensions as determined by the normal wedge) is caused
 80 to cooperate with the normal wedge in gaging the position of the mold-blade and the dimensions of the type.

The gist of the present invention and that for which protection is sought is the broad
 85 idea of recording on the pattern both the line deficiency and the number of justifying spaces for each line as composed thereon or therein, and equipping the automatic or final composing mechanism with means adapted
 90 and operating to automatically translate said record into fractional measurements distributed among the total number of indicated spaces, and although here shown, by way of illustration, as embodied in and specially
 95 adapted to a well known form of composing machine adapted to produce type and to be controlled by a pattern wherein the signals are composed of perforations, the invention is not limited thereto, but, on the
 100 contrary, is applicable in its broadest features, to many other known varieties of automatic composing machines, such as typewriters, type setters, matrix making and other like machines, wherein a previously
 105 composed pattern, either in the form of a perforated record strip, settable pins, or other signal means, operates to automatically control the selection of characters and the measurement of the spaces for each line
 110 of composition.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent, is:—

1. A pattern controlled composing machine
 115 provided with space dimensioning devices and a shortage distributing or apportioning mechanism, the latter adapted to be controlled by space-number and line-deficiency signals of the pattern and operating
 120 to automatically adjust said space dimensioning devices.

2. In a composing machine provided with character selecting and space dimensioning means adapted to be controlled by a composed
 125 pattern, and in combination therewith, an automatic shortage distributing or apportioning mechanism controlled by pattern signals designating the number of justifying spaces and the amount to be absorbed by
 130

justification in each line of composition and operating upon or through the space dimensioning devices to produce justifying spaces appropriate to each line of matter.

3. In a pattern controlled composing machine provided with character and space selecting devices adapted to be automatically controlled by the signals of a composed pattern, and in combination therewith the following elements, to wit; a space dimensioning mechanism; a line shortage distributing or apportioning mechanism connected with said space dimensioning mechanism; and a pattern provided with signals controlling the character and space selecting devices, and, in addition thereto, signals designating number of justification spaces and amount to be absorbed by justification said additional signals controlling constituent elements of the distributing or apportioning mechanism.

4. A pattern controlled composing machine whereof the pattern in addition to the character and space designating signals is provided with signals pertaining to each line of composition denoting line-deficiency and number of spaces, and in combination therewith, an automatic shortage distributing or apportioning mechanism controlled by said line-deficiency and space-number signals to effect a division of the indicated line deficiency by the indicated number of spaces, and in turn controlling the space dimensioning devices, to set the latter to accord with the ascertained quotient.

5. In a composing machine such as described wherein the selection and dimensioning of the characters is controlled by a succession of signals constituting a pattern of the matter to be composed and in combination therewith, line-deficiency and space-number signals associated with each group of character signals in the pattern representing a line of matter, mechanism for dimensioning the spaces, and a shortage distributing or apportioning mechanism coupled with said space dimensioning mechanism and controlled by said line-deficiency and space-number signals to automatically set the space dimensioning devices to correspond with the quotient of the indicated line deficiency divided by the indicated number of spaces.

6. In an automatic pattern controlled composing machine the combination of the following elements, to wit; character and space selecting mechanism; a space dimensioning mechanism; a shortage distributing or apportioning mechanism including deficiency-measuring, translating or divisional and quotient components, the last named connected to the space dimensioning mechanism; and a pattern composed of successive groups of signals, each group, representing a line of matter and comprising a series of signals controlling the character and space

selecting mechanism associated with signals representing the deficiency of the line and the number of justifying spaces contained therein, the one controlling the deficiency measuring and the other the translating component of the shortage distributing or apportioning mechanism.

7. In a composing machine such as described provided with space dimensioning and pattern controlled positioning devices and in combination therewith the following elements, to wit; a distributing or apportioning mechanism including measuring, dividing and quotient elements, the latter coupled with said dimensioning devices; and pattern controlled means for coupling said measuring and dividing elements with the positioning means.

8. In a composing machine such as described provided with space dimensioning devices, positioning devices and a pattern controlling said positioning devices and in combination therewith a distributing or apportioning mechanism including measuring, dividing and quotient elements, and means controlled by the pattern for coupling said measuring and dividing element with the positioning devices, and for coupling said quotient element with the space dimensioning devices.

9. In a composing machine such as described provided with space dimensioning and pattern controlled positioning mechanisms and in combination therewith the following elements, to wit; a distributing or apportioning mechanism including measuring, dividing and quotient elements, the latter connected with the space dimensioning devices, and pattern controlled means for coupling said positioning mechanism and measuring element to adjust the latter.

10. In a composing machine such as described, provided with space dimensioning and pattern controlled positioning mechanisms and in combination therewith the following elements, to wit; a distributing or apportioning mechanism including measuring, dividing and quotient elements, the latter coupled with said space dimensioning devices; and pattern controlled means for coupling said dividing element with the positioning mechanism.

11. In a composing machine such as described provided with pattern controlled positioning means and space dimensioning devices and in combination therewith a shortage distributing or apportioning mechanism including measuring, dividing and quotient elements, and means controlled by the pattern for connecting said positioning means and measuring element to adjust the latter.

12. In a composing machine such as described provided with space dimensioning and pattern controlled positioning means and in combination therewith a distribut-

ing or apportioning mechanism coupled with the space dimensioning means and including measuring, dividing and quotient elements, and means controlled by the pattern for coupling said positioning means and measuring element and determining the position of the latter.

13. In a composing machine such as described provided with a pattern controlled positioning mechanism and in combination therewith the following elements, to wit; a distributing or apportioning mechanism including measuring, dividing and quotient elements; pattern controlled means for coupling said positioning mechanism with said measuring and dividing elements; and pattern controlled locking devices for said dividing element.

14. In a composing machine such as described provided with two pattern controlled positioning mechanisms and in combination therewith the following elements, to wit; a distributing or apportioning mechanism including measuring, dividing and quotient elements, and pattern controlled means for coupling said measuring element with one and said dividing element with the other of said positioning mechanisms.

15. In a type making and composing machine such as described provided with a plurality of matrices, an adjustable mold and pattern controlled positioning mechanism and in combination therewith the following elements, to wit; a shortage distributing or apportioning mechanism including deficiency measuring, dividing and quotient elements; pattern controlled means for coupling said deficiency measuring and dividing elements with said positioning mechanism; and pattern controlled mechanism for coupling said quotient element with the adjusting member of the mold.

16. In a composing machine such as described provided with space dimensioning devices and pattern controlled positioning mechanism and in combination therewith a deficiency distributing or apportioning mechanism including measuring dividing and quotient elements the latter connected to the space dimensioning devices and provided with means for varying the relation between said quotient element and space dimensioning devices.

17. In a composing machine such as described provided with a pattern controlled positioning mechanism for selectively presenting different characters at a common impression point and in combination therewith a distributing or apportioning mechanism including pattern controlled measuring and dividing elements.

18. In a composing machine such as described provided with a pattern controlled positioning mechanism for selectively presenting different characters at a common

impression point and with space dimensioning devices and in combination therewith a distributing or apportioning mechanism including measuring, dividing and quotient elements and pattern controlled means for coupling said measuring and dividing elements with the positioning mechanism and said quotient element with the space dimensioning devices.

19. In a composing machine such as described provided with pattern controlled positioning mechanism and in combination therewith the following elements, to wit; an admeasuring member or slide and means for coupling the same with the positioning mechanism to register line deficiency; a dividing member including a pivoted radius bar and movable interponent, the latter interposed between the radius bar and admeasuring member; means for coupling said interponent with the positioning mechanism and a quotient member coupled with said radius bar.

20. In a composing machine such as described provided with space dimensioning means and pattern controlled positioning mechanism and in combination therewith the following elements, to wit; an admeasuring member or slide provided with adjusting devices and means for coupling the latter with the positioning mechanism; a divider including a radius bar and an interponent; pattern controlled means for coupling said interponent with the positioning mechanism; a quotient member or slide coupled with said radius bar; and pattern controlled devices for connecting said quotient member with the space dimensioning means.

21. In a type casting and composing machine such as described provided with mold blade abutment, normal wedge, transfer blocks and pattern controlled positioning jaws and in combination therewith a movable abutment coupled with one of said transfer blocks and a pattern controlled line deficiency distributing or apportioning mechanism coupled with said last named abutment to vary the dimensions of the space type.

22. In a type casting and composing machine such as described, the combination of the following elements, to wit; a movable abutment acting in conjunction with the normal wedge and a transfer block to adjust the mold; an auxiliary movable abutment acting in conjunction with the normal wedge and a second transfer block to adjust the mold; and a line deficiency distributing or apportioning mechanism controlling said auxiliary abutment.

23. In a composing machine such as described, the combination of the following elements, to wit; a positioning mechanism; a movable member; and a plurality of connecting members coupled with said movable

member and adapted to be engaged by said positioning mechanism at relatively different distances from said movable member.

24. In a composing machine such as described the combination of the following elements, to wit; a pattern controlled positioning mechanism; a movable member (29) provided with a plurality of engaging devices arranged at different points in the line of travel and adapted to be separately engaged with said positioning mechanism; and means for selectively coupling said engaging devices with the positioning mechanism.

25. In a composing machine such as described the combination of the following elements, to wit; a pattern controlled positioning mechanism including oppositely movable positioning jaws and a plurality of stop pins serially arranged; a movable member (29) provided with a plurality of connections or latches adapted to enter between said jaws at relatively different distances from said movable member; and pattern controlled means for selectively presenting either of said connections or latches in the path of the jaws.

26. In a composing machine such as described provided with pattern controlled positioning jaws, space dimensioning devices and a deficiency distributing or apportioning mechanism including measuring, dividing and quotient elements and in combination therewith the following elements, to wit; a movable member (69) controlling said dividing element; two latches coupled with said movable member each provided with an engaging portion adapted to be entered between said positioning jaws, said engaging portions being located at relatively different points in the line of movement of said member; means connected with each latch for shifting the latter into and out of the path of the jaws; and pattern controlled means actuating said latch shifting means.

27. In a composing machine such as described provided with pattern controlled positioning mechanism, space dimensioning devices and a distributing or apportioning mechanism including measuring, dividing and quotient members and in combination therewith the following elements, to wit; means for adjusting said measuring element including a wedge, an actuating bar coupled therewith and means controlled by the pattern for coupling said actuating bar and positioning means; means for adjusting said dividing element including a latch adapted to be coupled with the positioning mechanism and means for actuating said latch including devices for connecting it with the positioning mechanism; a motor actuated latch and a member (78) coupled with the actuating bar of the adjusting means for said measuring element.

28. In a composing machine such as described, and in combination with the pattern controlled positioning mechanism and space dimensioning devices thereof the following elements, to wit; an automatic line deficiency distributing or apportioning mechanism including measuring, dividing and quotient elements; means for adjusting said measuring element including two wedges differing in pitch and each provided with an actuating bar adapted to be coupled with the positioning mechanism; pattern controlled means for separately coupling said bars with said positioning mechanism; means for adjusting said dividing element, including a latch adapted to be coupled with the positioning mechanism; and pattern controlled means for actuating said latch, including shifting devices and a piston.

JOHN SELLERS BANCROFT.
MAURITZ C. INDAHL.

Witnesses:

MORTIMER A. JONES,
JOSEPH B. CHURCH.