

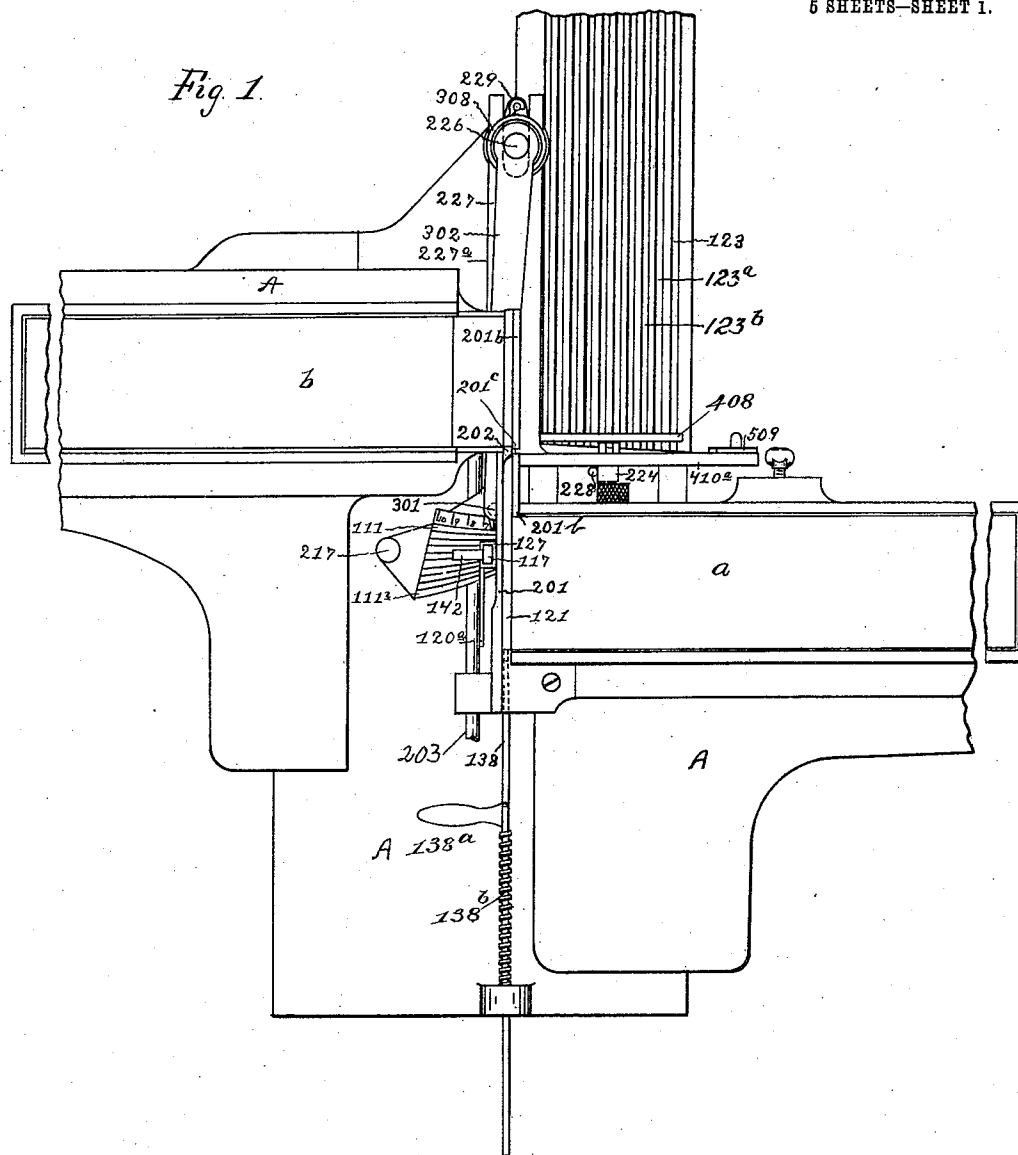
No. 844,558.

PATENTED FEB. 19, 1907.

B. M. DES JARDINS.
TYPE JUSTIFIER.

APPLICATION FILED JULY 11, 1895.

5 SHEETS—SHEET 1.



Witnesses:

Eva S. Shelton

Janette S. Ellsworth

Inventor:

Benj. M. Desjardins

No. 844,558.

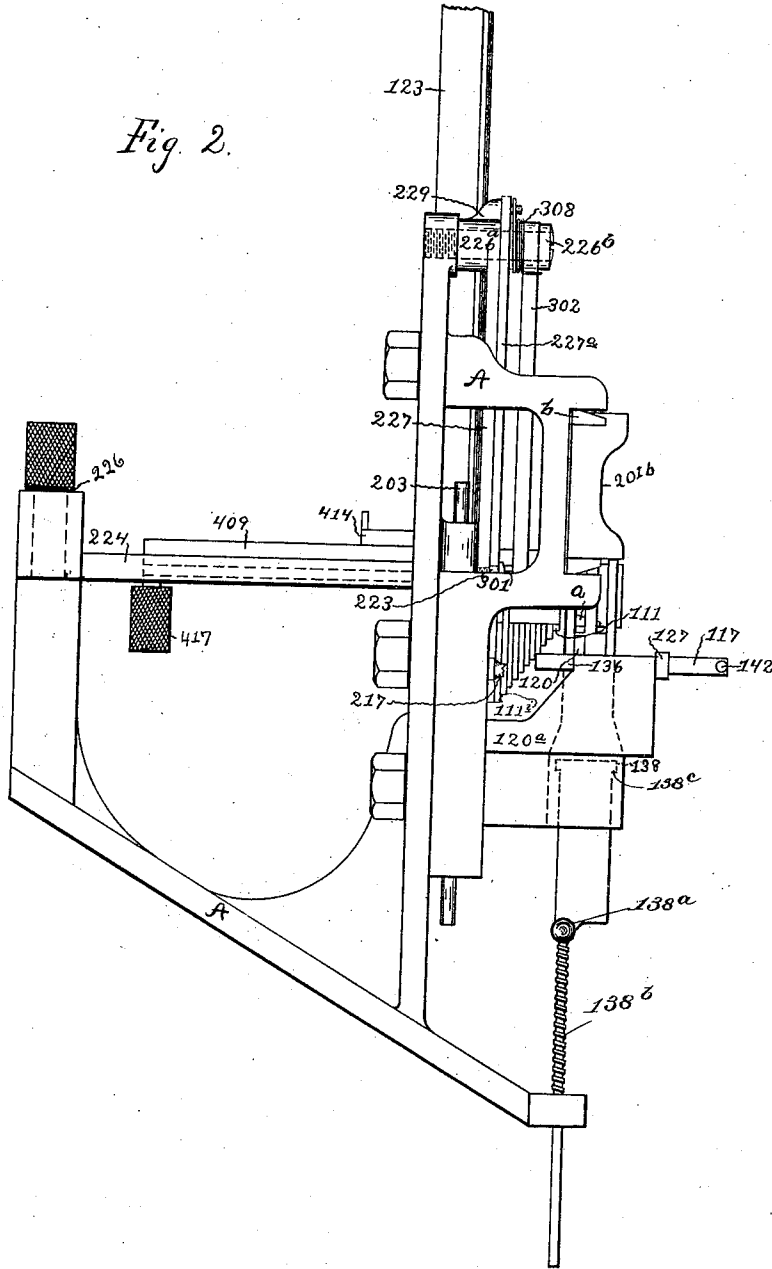
PATENTED FEB. 19, 1907.

B. M. DES JARDINS.
TYPE JUSTIFIER.

APPLICATION FILED JULY 11, 1895.

5 SHEETS—SHEET 2.

Fig. 2.



Witnesses:

Eva S. Shelton.

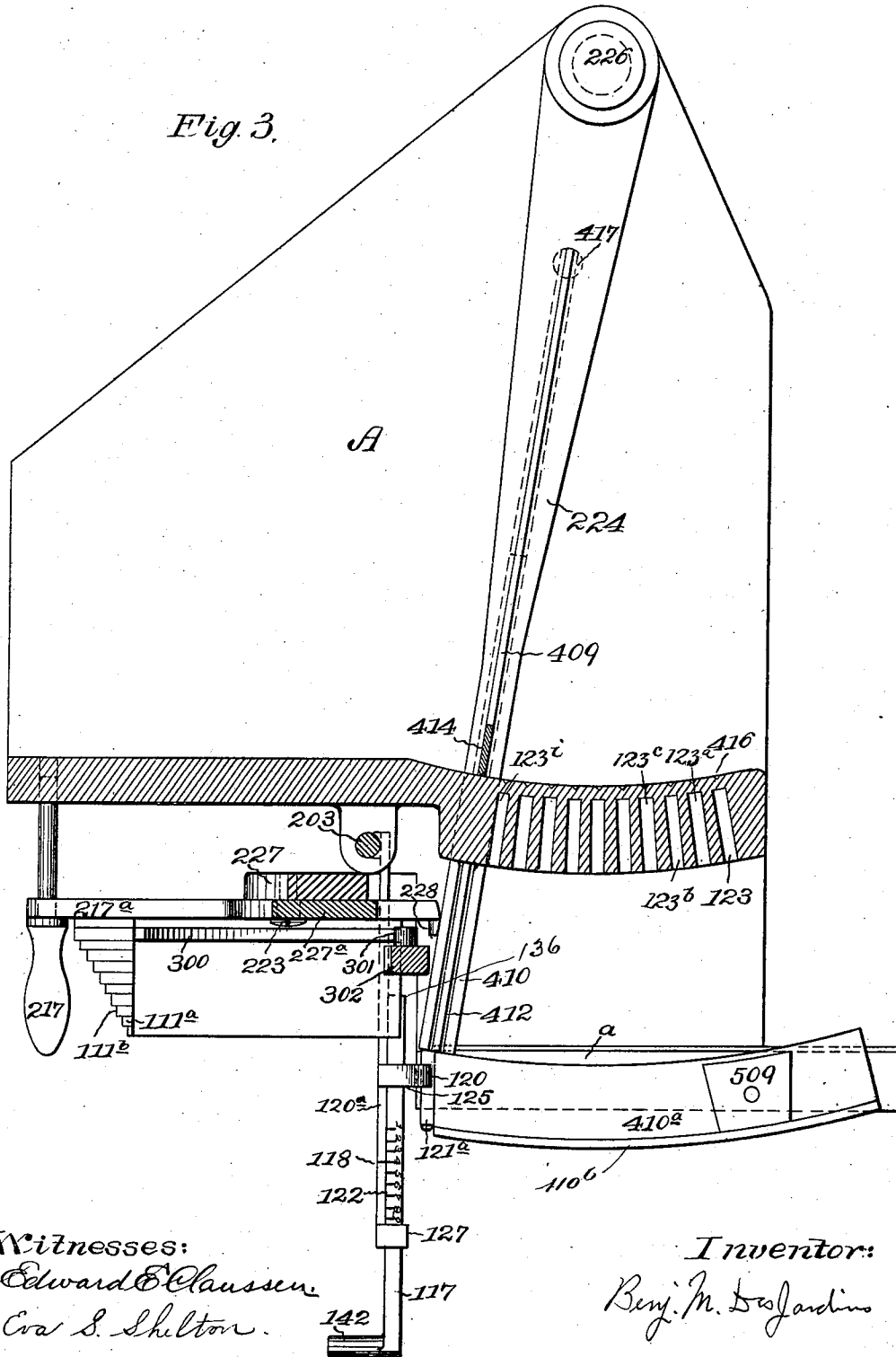
Janette S. Ellsworth

Inventor:

Berj. M. Desjardins

B. M. DES JARDINS.
TYPE JUSTIFIER.
APPLICATION FILED JULY 11, 1896.

Fig. 3.



Witnesses:
Edward E. Claussen.
Cora S. Shelton.

Inventor:
Benj. M. Desjardins

B. M. DES JARDINS.
TYPE JUSTIFIER.

APPLICATION FILED JULY 11, 1896.

6 SHEETS—SHEET 4.

Fig. 5.

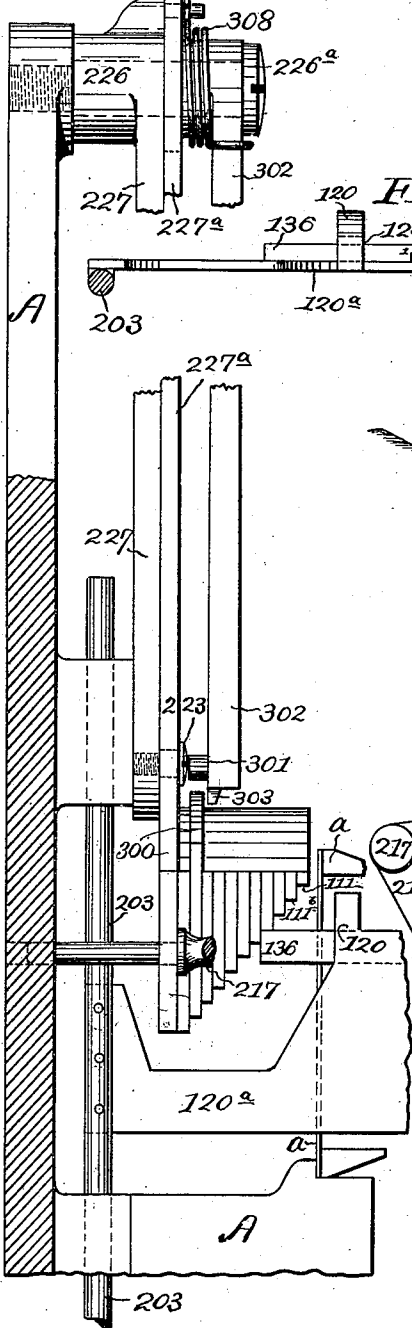


Fig. 6.

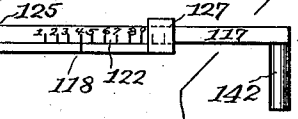
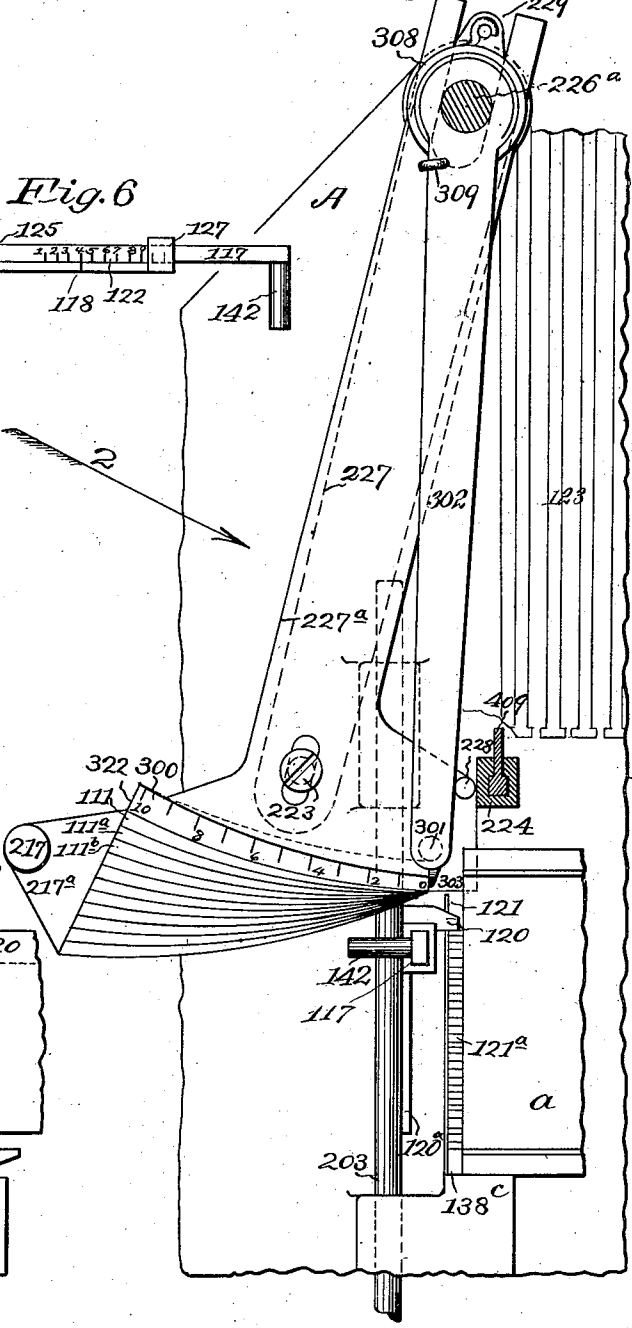


Fig. 4.



Witnesses:
Edward S. Claussen,
Carl S. Shelton.

Inventor:
Benj. M. Desjardins

No. 844,558.

PATENTED FEB. 19, 1907.

B. M. DES JARDINS.
TYPE JUSTIFIER.

APPLICATION FILED JULY 11, 1896.

6 SHEETS—SHEET 5.

Fig. 7.

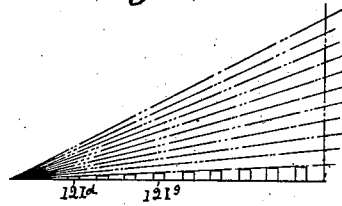


Fig. 8.

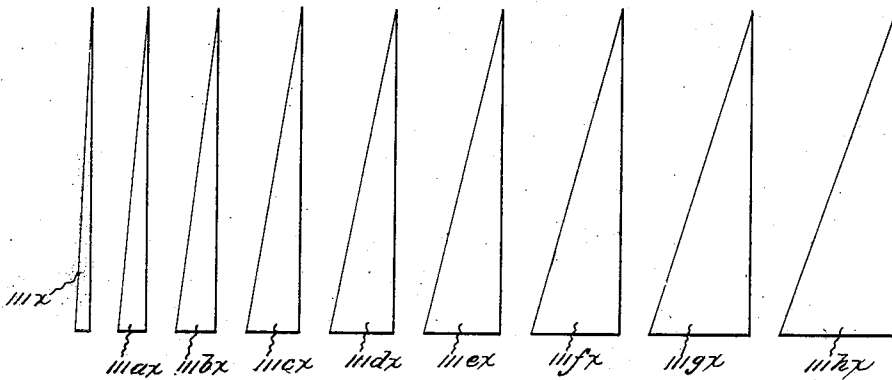
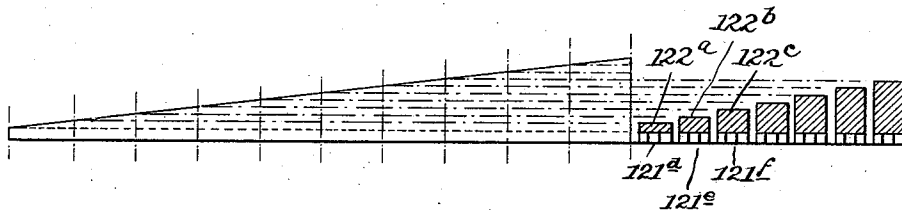


Fig. 9.



Witnesses:

Edward E. Claussen
Eva S. Shelton.

Inventor:

Benj. M. Desjardins

UNITED STATES PATENT OFFICE.

BENJAMIN M. DES JARDINS, OF HARTFORD, CONNECTICUT, ASSIGNOR, BY
MESNE ASSIGNMENTS, TO THE UNITYTYPE COMPANY, A CORPORATION OF
NEW JERSEY.

TYPE-JUSTIFIER.

No. 844,558.

Specification of Letters Patent.

Patented Feb. 19, 1907.

Application filed July 11, 1895. Serial No. 555,669.

To all whom it may concern:

Be it known that I, BENJAMIN M. DES JARDINS, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented a new and useful Type-Justifier, of which the following is a specification.

This invention relates to justifying mechanism, and is especially intended for use in machines for justifying assembled lines of type, although applicable also in line-justifying mechanism of other classes.

In the following specification I shall term the difference between the amount of matter in an unjustified line and the required length of the line or column measure the "shortage" of the line. The places between words in which justifying-spaces are to be inserted I shall term "intervals," and the final quads or pieces used to separate the words in the justified line will be termed "justifying-spaces." The shortage of the line divided by the number of intervals will give the average width of the justifying-spaces, and this average width I shall term a "normal space."

The invention will be illustrated and described as embodied in a machine employing a limited number of ready-made justifying-spaces and in which the justifying-space magazine contains a graduated series of spaces—that is, a series in which the spaces in consecutive channels differ by a uniform amount, which amount for convenience will be termed a "unit." The normal space for a line will usually fall between two of the sizes of spaces provided in the machine, in which case the line will be justified by selecting a certain number of spaces of the size next larger and the balance of the size next smaller than the normal space. The devices for indicating the relative numbers of the two sizes of spaces to be used I shall term "difference" devices.

The invention includes a novel device for determining the normal space from the shortage of the line and the number of intervals, consisting of a series of inclined gaging-surfaces corresponding to the number of intervals in a line and so constructed that the surface selected in accordance with the number of intervals will enter the shortage, so as to determine the size of the space which, multiplied by the number of intervals, will justify the line.

This device is applicable in machines in which the justifying-spaces are formed in the machine or supplied in any manner, and if a sufficient number of sizes of justifying-spaces are provided sufficiently-accurate justification can be thus secured. In justifying with ready-made spaces, however, only a limited number of sizes can conveniently be used, and the invention includes also difference devices combined with the normal space-determining devices by which the number of two different sizes of spaces required to justify the line is determined, thus securing accurate justification with a small number of sizes of spaces.

The invention includes also certain features of construction and combinations of parts in justifying mechanism, all as fully described hereinafter and particularly pointed out in the claims.

That my invention may be seen and fully understood by others, reference will be had to the following specification and annexed drawings, forming a part thereof, in which—

Figure 1 is a front elevation of my machine; Fig. 2, a left side elevation of said machine; Fig. 3, a sectional plan view of the same; Fig. 4, an enlarged detailed view of the gage-plates and accompanying parts, showing their location with reference to the type-line, the space-plunger, and the space-channels, the latter being represented by broken lines; Fig. 5, a side view of Fig. 4 in the direction of the arrow 5; Fig. 6, an enlarged plan view of the line-gage which intervenes between the type-line and the gage-plates; Fig. 7, a diagram illustrating the method of constructing the spaces with reference to their thicknesses, the distances apart of the space-channels, and the amount of taper in the gage-plates employed; Fig. 8, a series of diagrams showing the individual amount of taper in each of the plates employed in gaging lines containing different numbers of spaces, and Fig. 9 a diagram illustrating the method of constructing the difference-gage and its application in determining the number of each of two sizes of spaces needed.

Similar letters and figures of reference designate like parts in the drawings and specification.

In its general organization this improve-

ment embraces a series of space-channels, Figs. 1 and 3, arranged in the form of an arc of a circle convenient to the sweep of a swinging space-plunger mechanism. Acting in conjunction with the space-plunger mechanism is a series of tapered gage-plates mounted on the lower end of an oscillating arm and adapted to swing against the free end of the plunger-arm. These gage-plates also act in conjunction with a member adapted to rest directly upon the type-line, and the relation of parts is such that by bringing said member and said plates together or into operative relation with each other the space-plunger is thereby located adjoining the channel which contains the size of spaces wanted, as will appear from the following description.

The swinging arm 227 is pivotally mounted on the stud 226^a, projecting from that part of the frame A which supports the space-channels 123 123^a 123^b, &c. The arm 227 is supplemented by the gage-plate-supporting arm 227^a, connected to said arm 227 by means of the shouldered screw 223, passing through a slot near the lower end of the second arm and threaded into the first arm. The upper end of the arm 227^a is bifurcated to engage the stud 226^a. The depth of the bifurcation and the length of the slot in the arm 227^a are sufficient to allow said arm a longitudinal play for a distance equal to the difference in width between the ends of the difference-gage 300. The pin 217 passes through a hole in the left-hand extension 217^a of the arm 227^a and enters a corresponding hole in the frame A to retain said arm in the position shown in Fig. 4, when it is desired to hold the gage-plates 111, &c., out of the way of other members presently to be described. An extension to the right from the base of the arm 227^a is provided with the fixed pin 228. The spring 308 has its inner end 229 fastened to a pin projecting from the top of the arm 227 and after encircling the hub of the arm 302 several times has its outer end 309 hooked on said arm 302, which is also pivotally mounted on the stud 226^a and is free to swing thereon. On the lower end of the arm 302 is the roller 301, located directly over the plate which constitutes the difference-gage 300 and at a sufficient height above the narrower end thereof to allow the upper edge of the gage 111 to be lifted to the plane where the line should end. The arm 302 is also provided with the pointer 303 at its lower extremity, which extends over the graduations of the scale 322 on the gage 300. The motion to the right of the arm 302 is limited by the pin 228.

On account of the manner in which the spring 308 is secured to the arms 227 and 302 the resiliency of the same gives said arm 227 a constant tendency to swing to the left and

said arm 302 a similar tendency to swing to the right. The arm 227^a is held in reciprocal relation against the front face of the arm 227 by the screw 223 and the stud 226^a, as before intimated and shown in Fig. 4. The oscillating arm 224 is pivotally mounted to the rear of the frame A by the stud 226, and the front end of said arm is free to swing past all of the space-channels 123, &c. The arm 224 is provided with a T-groove extending nearly the entire length of the same or for a sufficient distance to receive the T-shaped base of the space-plunger 409 and allow said plunger to travel from a position back of the channels 123, &c., to the platform 410^a, Fig. 3. The arm 224 has the elevated extension 410 between the channels 123, &c., and the platform 410^a, which is provided with the guideway 412 approximately the width of each of said channels, to receive and guide the spaces while being transferred to said platform. The plunger 409 slides freely along the arm 224, being operated by means of the handle 417, which is integral with said plunger. The space-engaging upper portion of the plunger 409 is thinner than the width of each channel 123 123^a, &c., and the bottom of the latter is also considerably narrower than that part into which the spaces are inserted, thereby providing shoulders on each side for said spaces to rest upon when said plunger is withdrawn from under them. The slots in the bottoms of the channels 123, &c., are of sufficient width to permit of the passage of the plunger 409 through the same. The latch-bolt 414 is mounted on the arm 224 immediately over the plunger 409, and a suitable spring (not shown in the drawings) tensions said bolt forward with its front end adapted to mesh with or engage the nicks 416. The nicks 416 are cut into the frame or casting directly behind the channels 123, &c., each of said nicks being on a medial line in the rear of one of said channels. The front terminal of the horizontally-swinging plunger-arm 224 lies or operates in the path of the vertically-swinging arm 227^a, the pin 228 of the latter coming into contact with the former.

The vertical rod 203 is free to slide and partially turn in suitable bearings projecting from the frame A. The forwardly-projecting plate 120^a is rigidly attached to the rod 203 and has the gage 120 extending to the right therefrom. When the gage 120 is in position at the extreme right of its horizontal or lateral travel, it extends into the line-channel 121. The plate 120^a is cut away to provide clearance for the gage-plates 111, &c., and extends far enough forward to support the slideways 125 and 127 for the graduated bar 117. The bar 117 is provided with the handle 142 on its front end, the gaging-finger 136 on the rear terminal, and the intermediate scale 122, said finger being located in the

path of the gage-plates 111, &c., and said scale adapted to register with the index-line 118 on the upper edge of the plate 120^a.

The type-galley *a* is located at the right, and its left end opens into the line-channel 121, which is located at the center of the machine. The left wall 201 of the channel 121 is fastened to the frame A below the galley *a* and extends upward to the lower edge of the galley *b*. The wall 201 is provided with the spring projection 202, extending to the right into the channel 121 and the path of a rising type-line. The top of the projection 202 is on a level with the lower edge of the galley *b*, and said projection inclines from said top downward to the left. The lifting-blade 138 enters the channel 121 and is tensioned upward by the spring 138^b, interposed between the base of said blade and the bearing for a guide-rod depending from said base. The blade 138 is depressed by means of the handle 138^a, rigidly attached thereto. The downward movement of the blade 138 is limited by the shoulders 138^c, which come to a rest in the guideway through which said blade reciprocates when the top of the latter is flush with the lower edge of the galley *a*, thereby forming a base for the channel 121. Sufficient upward play is allowed the blade 138 for it to reach above the plate 120^a. The wall 201 is slotted above the blade 138 for the purpose hereinafter explained. The receiving-galley *b*, which also opens into the line-channel 121, extends to the left from the center of the machine and has its lower edge a little higher than the top of the space-receiving platform 410^a. Directly over the platform 410^a and opposite the end of the spring-projection 202 is the opening 201^c in the right channel-wall 201^b, sufficiently wide to receive the thickest space. The platform 410^a is located at the proper height to receive the selected spaces and is constructed in the form of an arc of a circle to conform to the path of the front end of the arm 224. The space-pushing block 509 is constructed to slide on the platform 410^a against the rim 410^b on the front of said platform.

The gage-plates 111 111^a 111^b, &c., which are rigidly mounted on the arm 227^a, have their contact edges curved to correspond with the arc made by the sweep of the arm 227^a, and they are constructed with reference to their respective amount of taper so as to coincide with or bear a proportional relation to the planes which lie under and on top of the bottom spaces in the channels 123 123^a 123^b, &c. The planes above referred to are illustrated by the diagram designated as Fig. 7. The gage-plate 111 in Fig. 4 is in theory similar to the gage diagram 111^x, in Fig. 8, said diagram being a counterpart of that shown by the two lower lines in the previous figure. The base-line in Fig. 7 may be said to represent a plane passing under the

spaces in the channels 123, &c., and the next line a plane passing over the bottom spaces therein, although in said channels the plane above the first set of spaces is horizontal for the purpose of providing a more convenient construction for alinement with the path of the arm 224. The space diagrams 121^d 121^e &c., represent by their relative positions and sizes the spaces as they lie in the channels 123, &c., with reference to their sizes and distances apart. The plane represented by the third line from the bottom in Fig. 7, reckoning the base-line as the first, may be said to represent the plane that passes over the second set of spaces which lie in the bottoms of the channels 123, &c., and so with the fourth line, the fifth, sixth, &c., shown in said figure. As already intimated, the two lower lines shown in Fig. 7 are reproduced at 111^x, Fig. 8, the first and third lines in the former figure appear at 111^a^x in the latter figure, the first and fourth lines at 111^b^x, &c.

From the foregoing explanation it will be seen that each of the diagrams in Fig. 8 represents the total dimension of a fixed number of spaces with which the channels 123 123^a 123^b, &c., are provided. The proportional relationship between the gage-plates 111 111^a, &c., and the planes at the top and the bottom of the given numbers of spaces in the bottoms of the channels 123, &c., is governed by the position of the fixed pin 228 of the arm 227^a and the position in front of said channels where said pin engages the arm 224. Hence the motion of said first-mentioned arm to the right locates the plunger 409 on said arm 224 opposite the size of spaces that corresponds to the dimension of the particular gage-plate 111, &c., at the point where the latter strikes the finger 136, which represents the height of the line upon which its connections rest. In this machine for purposes of convenience the arm 224, with the plunger 409, is made to line up with the next larger channel 123, &c., than the one actually indicated or the one containing the particular size of spaces which is next larger than the size having dimensions equal to those of that part of the gage 111, &c., which lies over the type-line representative or finger 136. Sometimes the plunger 409 will be pushed by this method to a position between two of the channels 123 and 123^a, &c., and when said plunger is brought back until it is directly behind one of said channels the size of that part of the gage-plate 111 or 111^a, &c., which lies directly over the line or its representative will then be exactly the size of the spaces opposite which said plunger has been located, and the small amount of return given to said plate consequent upon changing the position of the plunger causes the arm or slide 227^a to move down and the roller 301 to separate from the difference-gage 300. The difference-gage 300 is con-

5 constructed with the same amount of taper as the gage-plate 111 and is also rigidly attached to the bar 227^a. The amount of taper in the gage 300, the purpose thereof, and the functions of the same are illustrated by the diagram shown in Fig. 9. The graduations of the scale 322 on the gage 300 with refer-
 10 ence to their distances apart bear a proportionate relation to the channels 123, &c., which is the same as that explained in connection with the plates 111, &c. The increase in the size of the plate 300 between any two of the graduations of the scale 322 is equal to the difference between the sizes of
 15 two neighboring spaces. Assuming that the spaces used differ from each other in thickness by six one-thousandths of an inch, for instance, the dimension of said gage at the second graduation is six one-thousandths of an inch greater than at the first graduation, and so on. This fact is illustrated by the
 20 vertical and horizontal lines in Fig. 9, in which the space-diagrams 121^d 121^e 121^f, &c., which lie between the full base and the dotted line, represent real space-bodies. That part of each of the said space-diagrams shown in section and extending to the respec-
 25 tive planes (indicated by the dot-and-dash or broken lines) is equal to the dimension of the taper or incline of the transversal shown in Fig. 9 at each of the corresponding intersecting vertical lines, which latter stand for the positions of the graduations on the scale 322.
 30 The successive space-diagrams 122^a 122^b, &c., (shown in section in Fig. 9) indicate the integral differences which would remain to be filled in various lines with the lines spaced with the largest size of spaces which could
 35 be uniformly inserted in them. The difference 122^a would be filled by inserting one space of the next larger size. The difference 122^b would be filled by inserting two spaces of the next larger size, &c. In other words,
 40 the space-diagrams 122^a 122^b, &c., indicate by their height and their position the amount of space to be inserted in the line by using the larger size of spaces and the number of said larger size to be used. As previously stated,
 45 the lower part of the diagrams marked 121^d 121^e, &c., indicate the uniform space-bodies for the line or the smaller size of spaces used in justifying.
 50 The series of gage-plates 111 111^a provide by their operative faces a series of progressively-inclined gaging-surfaces, each surface representing piles of a given number of spaces, the different surfaces representing piles having different numbers of spaces.
 55 That the foregoing description may be more clearly understood a concrete example of the method of justifying a line of type with the devices provided in this machine for that purpose will be given. For the sake of con-
 60 venience and brevity I will term the .006"

difference between succeeding space-sizes, above referred to, a "unit." The smallest size in the left-hand channel 123ⁱ may be said to contain three of these units and the largest in the right-hand channel 123 twelve
 70 of said units, with the intermediate sizes in the intermediate channels each increasing by one unit. Given a type-line having places therein for five spaces and a shortage of .288"
 75 in length, to ascertain the two successive sizes of spaces with which the machine is equipped best adapted to most accurately justify said line and the necessary number of
 80 each of said sizes, provided, of course, that the same cannot be justified with a single size. The amount of shortage is an unknown quantity in practice, except as ascertained by the traverse of the same by the line-gage 120.
 85 The height of the short type-line as found by the gage 120 is communicated to the bar 117, which is pushed to the rear until the fifth graduation on the scale 122 registers with the index-line 118 on the plate 120^a, thereby locating the finger 136 below the gage-plate
 90 111^d, (the fifth one,) representing the dimensions of piles of successive sizes of spaces, each pile containing five of said spaces and at the proper elevation to register on said
 95 gage the exact size of spaces required, provided the machine was supplied with an infinite number. The gage-plate 111^d when wedged tightly over the finger 136 locates the arm 224 between the channels 123^b and
 100 123^a, for example, and said arm is returned to the left until the point of the bolt 414 enters the nick 416 in the rear of the channel 123^b. This size of spaces is too large, five of them being equal to a line shortage of .300", which is obtained by multiplying the ten
 105 units, or .060", in a single space contained in the channel 123^b by five. The spaces in the channel 123^c are too small, five of them being equal to only .270", leaving a difference of .018", or three units. When the arm 224
 110 was returned until checked in operative relation with the channel 123^b, the top of the difference-gage 300 dropped away from the roller 301 a distance equal to the difference or the number of units necessary to be added to the spaces corresponding to those really
 115 designated by the gage-plate 111^d, being those in the channel 123^c. The number of said units is shown by the pointer 303 on the scale 322 when the roller 301 is brought solidly against the top of the gage 300 by a
 120 movement of the difference-arm 302 to the left. In this case the pointer 303 stops at the third graduation, and thereby determines the number of larger sizes of spaces to be used. Three of the spaces in the channel
 125 123^b are equal to .180", and two of those in the channel 123^c are equal to .108", which, added together, give .288", the amount of line shortage.

The bracket and other parts of the frame 130

A that support the several operative members, are tilted back at a suitable angle to safely hold for manipulation, loose type-lines and spaces, as will be understood by referring to Fig. 2. In the drawings and specification, however, these operative parts, which are inclined in practice, are shown and described for the sake of convenience and brevity as standing vertically.

The complete mechanical operation of the machine is as follows: A column of unjustified type is inserted in the galley *a*, and for this construction the lines are preferably left without any dividing-spaces between the words; but said lines are leaded to prevent the loose uneven ends from becoming displaced. With his right hand at the right of the column and his left on the handle 138^a to hold the blade 138 at its lowest position the operator pushes said column to the left until it stops against the channel-wall 201. The number of words or of places for spaces is then counted and the plate 120^a pushed up and swung to the right until the gage 120 is over the type-line 121^a in the channel 121, when said gage is depressed onto the top of said line. The bar 117 is next adjusted by means of the handle 142 until the particular graduation on the scale 122 which corresponds with the number of required spaces registers with the index-line 118 on the upper edge of the plate 120^a. This latter operation brings the finger 136 directly under and in the path of the plate 111 or 111^a, &c., which is constructed to gage a line requiring the number of spaces needed in the present line. The pin 217 is withdrawn from the frame A and the arm 227^a swung to the right until the said gage-plate comes in contact with the finger 136 and is wedged tightly into place with the upper edge of the difference-gage 300 hard against the roller 301, the sliding connections between said arm and the arm 227 being provided for this purpose. Previous to the movement of the arm 227^a the arm 224 was swung to the left end of its path, and the pin 228 on said arm 227^a comes in contact with said arm 224, when the position of the former is changed, swinging the latter to the right, the bolt 414 clicking over the nicks 416. If the bolt 414 registers with one of the nicks 416, the line can be justified with one size of spaces throughout, and it is only necessary to push the arm 224 along to the right to the next one of said nicks, which locates the plunger 409 opposite the size corresponding with the dimension of the said gage-plate that is directly over the finger 136. Usually, however, the bolt 414 stops somewhere intermediate of two of the nicks 416, in which event the arm 224 is returned to the left until the point of the bolt 414 enters the adjacent nick, thereby locating said arm with the plunger 409 back of the next larger size of spaces than that which would be indi-

cated by the said gage-plate if said plunger had been thus located thereby. The return motion of the arm 224, however slight, moves the arm 227^a a corresponding distance to the left, and gravity causes said latter arm to slide down the arm 227 as the gage-plate passes over the finger 136 in the direction of its narrower end. The dropping of the arm 227^a separates the difference-gage 300 from the roller 301. Now with the thumb on the pin 217 and his finger on the arm 302 the operator swings said arm toward the wider end of the gage 300 until the roller 301 wedges firmly against the upper edge of said gage. He notes the position of the pointer 303 relative to the scale 322 and reads thereon the figure which designates the number of space differences or units needed in addition to the spaces already indicated—viz., the smaller of the two sizes above referred to. As stated, the arm 224 has already been located opposite the larger of the said two sizes. By the process or method hereinbefore set forth and from the designated figure on the scale 322 the operator determines the number of the said larger spaces required, each of said spaces being one unit larger than the smaller-sized spaces. The arm 227^a and its gaging members having done their work, said arm is secured in place by the pin 217 out of the way of succeeding manipulations of the type-line, and the handle 138^a is released to permit the blade 138 to move upward with the incomplete type-line under the influence of the spring 138^b as fast as the words are removed from said line until the upper end of said blade is in line with or a little above the vertical slots or openings in the wall 201. With a suitable rule the operator engages the word at the top of the line and pushes it upward past the spring projection 202 into that part of the channel 121 which is opposite the galley *b*, the pushing-block 509 meanwhile being held against the right wall 201^b of said channel to close the opening 201^c. The block 509 is then pushed to the right beyond the position of the arm 224 and the plunger 409 drawn forward by means of the handle 417, carrying with it the bottom space from the channel 123 or 123^a, &c., through the guideway 412 in the extension 410 and landing said space on top of the platform 410^a. The bar 408 is attached to the front of the channel 123, &c., at the proper height to prevent the spaces above the bottom ones from being disturbed by the forward movement of the plunger 409. By actuating the block 509 again to the left the space on the platform 410^a is carried thereby to the opening 201^c, through which it is thrust against the spring projection 202, where said space is held suspended until removed by the second word as it is raised in the channel 121 to a position opposite the galley *b* beneath the first word. The operation of

transferring the spaces from their channel to the type-line and of incorporating the same with said line continues until as many of said spaces have been introduced into the line as were called for by the pointer 303, after which the arm 224 is actuated to the left until the bolt 414 engages the neighboring nick 416 to the one just left by it, thereby locating the plunger 409 opposite the smaller of the two selected sizes of spaces, and the operation of inserting the same in the line is resumed, as many of said spaces being employed as the total number required less the number of the larger size already utilized.

When all of the words have been raised above the projection 202, the new or justified line is transferred by hand to the left into the galley *b* with the help of the separating-rule 235, which is withdrawn at this time from between the justified column in said galley and said line inserted on the right side of the latter and then forced back into place at the end of the galley, carrying with it said column.

It will be evident that various changes in details of construction and relative arrangement of parts may be made without departing from the spirit and scope of my invention. To avoid misapprehension, I shall refer in the claims only to the gaging-surfaces of the inclined gages, which are the only operative parts of said gages. It will be evident that these gaging-surfaces and other cooperating parts may be employed in justifying mechanism generally, and I shall not therefore confine the broader claims to mechanism for justifying lines of type, although the mechanism shown is, in fact, especially adapted for that purpose.

These devices are applicable not only in machines for justifying composed lines of type or the like, but in line-justifying mechanism of other classes, and the term "justifying mechanism" herein is used in this broad sense to include all classes of typographic work in which lines are to be justified for printing or the production of printing-surfaces. These calculating devices in the machine illustrated and described herein are combined with a space-magazine and devices for supplying and inserting ready-made spaces; but it will be understood that the justifying-spaces the size of which is determined by these devices may be provided otherwise than by using ready-made spaces, suitable space forming or supplying and inserting devices being combined with the calculating devices for this purpose. The word "type" is used herein to include not only ordinary type, but also matrices and the like of any suitable material.

I do not claim herein justifying devices having an incline for dividing the line shortage by the number of intervals nor a series of gages corresponding to the number of inter-

vals in a line, these broad subject-matters being claimed, respectively, in my applications, Serial No. 550,015, filed May 20, 1895, and Serial No. 554,655, filed July 1, 1895, the present application being limited to a series of gages in which the gaging-surfaces are inclined, as defined by the claims.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a justifying mechanism, a series of differently and progressively inclined gaging-surfaces corresponding to the possible numbers of intervals in a line of print, for the purpose set forth.

2. In a justifying mechanism, a series of inclined gaging-surfaces, arranged progressively and corresponding respectively to the possible numbers of intervals in a line of print arranged in their natural order, for the purpose set forth.

3. In a justifying mechanism, a series of inclined gaging-surfaces, radiating from a common central line, and separated from each other by a uniform amount, for the purpose set forth.

4. In a justifying mechanism, a series of inclined gaging-surfaces radiating from a common central line and corresponding to the possible number of word intervals in a line of print, said surfaces being formed on a common support, for the purpose set forth.

5. In a justifying mechanism, a series of inclined gaging-surfaces radiating from a common central line and corresponding to the possible number of word intervals in a line of print, a cooperating part dependent for its position on the line shortage, and a support for said surfaces movable to carry them into and out of operative relation with said cooperating part, for the purpose set forth.

6. In a justifying mechanism, a series of inclined gaging-surfaces radiating from a common central line and corresponding to the possible number of word intervals in a line of print, a cooperating part dependent for its position on the line shortage, and a pivoted arm upon which said surfaces are supported, said arm being movable to carry said surfaces into and out of operative relation with said cooperating part.

7. In a justifying mechanism, a series of inclined gaging-surfaces corresponding to the possible numbers of intervals in a line of print, in combination with a line-gage arranged to measure the shortage of a line, and means for utilizing said measurement in conjunction with the gaging-surface representing the number of intervals in the line to determine the justifying-spaces for the line.

8. In a justifying mechanism, a series of inclined gaging-surfaces corresponding to the possible numbers of intervals in a line of print, in combination with a line-measuring gage, and a part movable with said gage and

having an independent movement to bring it into conjunction with the inclined gaging-surface corresponding to the number of intervals in the line, for the purpose set forth.

5 9. In a justifying mechanism, a series of inclined gaging-surfaces corresponding to the possible numbers of intervals in a line of type, and a movable support for said gaging-surfaces, in combination with a line-measuring channel, a measuring-gage arranged to
10 measure the shortage of a line in said channel, a part carried by the measuring-gage and movable into the paths of the inclined
15 gage-surfaces, and means for adjusting said part to engage the surface corresponding to the number of intervals in a line, for the purpose set forth.

10. In a type-justifying mechanism, a magazine for a graduated series of spaces,
20 and a space-ejecting plunger adjustable laterally of the magazine-channels, in combination with a series of inclined gaging-surfaces corresponding to the possible numbers of intervals in a line of print, a line-measuring
25 gage to determine the shortage of the line, and means controlled by said line-gage and inclined surfaces for locating the ejecting-plunger in register with the channel containing the proper justifying-spaces for a line.

30 11. In a type-justifying mechanism, a magazine for a graduated series of spaces, and a space-ejecting plunger adjustable laterally of the magazine-channels, in combination
35 with a series of inclined gaging-surfaces corresponding to the possible numbers of intervals in a line of print, a support for said surfaces movable transversely to the magazine-channels and adapted to locate the
40 ejecting-plunger, a line-gage for measuring the shortage of a line, and a part carried by said gage and adapted to cooperate with the inclined surface representing the number of intervals in a line and thereby limit the
45 transverse movement of said support and said plunger, for the purpose set forth.

12. In a type-justifying mechanism, the combination with a type-measuring channel,
of a slide movable in guides parallel to said channel, a gage carried by the slide and
50 adapted to enter the channel, and a part supported by said slide and movable laterally to the path of said gage, said part being adjustable to indicate the number of intervals in a line, for the purpose set forth.

55 13. In a type-justifying mechanism, the combination with a line-measuring channel, of a line-gage blade adapted to enter said channel and movable in the direction of the line to measure the shortage thereof, a slide
60 carried by said blade, and a scale and index to govern the adjustment of said slide in accordance with the number of intervals in a line, for the purpose set forth.

14. In a justifying mechanism, a magazine
65 for a graduated series of spaces, and a plun-

ger for ejecting said spaces, in combination with a series of inclined gaging-surfaces corresponding to the possible numbers of intervals in a line of print, a line-measuring gage operating in conjunction with said gaging-
70 surfaces to determine the normal justifying-spaces for a line, and means controlled by said gage and gaging-surfaces and adapted to indicate the proportion of spaces of greater and less value than the normal space required
75 to justify the line.

15. In a justifying mechanism, a magazine for a graduated series of spaces, and a space-ejecting plunger adjustable laterally of the magazine-channels, in combination with a
80 line-measuring gage, a series of inclined gaging-surfaces, a support for said surfaces movable to bring them into conjunction with the line-measuring gage, said support engaging the plunger to locate the same primarily in a
85 position corresponding to a normal space, and a difference device comprising a scale and pointer and adapted to indicate the number of units difference between the proper number of normal spaces and the
90 same number of the next smaller size of spaces provided in the magazine.

16. In a justifying mechanism, the combination with a line-measuring gage, of a series
95 of inclined gaging-surfaces corresponding to the possible numbers of intervals in a line of print, a support for said surfaces having a movement in one direction to bring the surfaces into conjunction with the line-measuring
100 gage and a limited movement in a second direction at right angles to the first, of a difference device comprising a pointer and scale adapted to measure said limited movement, for the purpose set forth.

17. In a justifying mechanism, the combination with a pivoted arm 227, of a slide having
105 a limited longitudinal movement thereon, a series of inclined gaging-surfaces mounted on said slide and corresponding to the possible numbers of intervals in a line of print,
110 and a difference device comprising a scale mounted on said slide adjacent to the gaging-surfaces, and an index carried by a second pivoted arm, said index having an angular
115 movement with relation to said slide and scale, and said scale having an eccentric surface adapted to intercept the index at different points dependent upon the position of the slide relative to the path of the index.

18. In a justifying mechanism for composing-machines, a wedge-piece consisting of a
120 series of wedges upon a common support in combination with means for selecting any desired wedge and rendering said wedge operative to control the justification of a line,
125 substantially as described.

19. In an organized machine for justifying a composed line of type, a series of inclined
plates, each plate differing in altitude from the adjacent plate by the same arbitrarily-
130

selected increment combined with mechanism for supplying the line with true spaces of the proper size and number to justify the line.

- 5 20. In an organized machine for justifying a composed line of type, a series of inclined plates, each plate differing in altitude from the adjacent plate by the same arbitrarily-selected increment a space-selecting device
10 for supplying the line to be justified with true spaces and connections between said series of plates and said device, whereby said device is properly set for each line to be justified.
- 15 21. In a justifying-machine the combination of a series of inclined plates, each plate differing in altitude from its adjacent plate by the same arbitrarily-selected increment.
- 20 22. In an organized machine for justifying a composed line of type, a series of inclined plates, each plate differing in altitude from the adjacent plate by the same arbitrarily-selected increment, with a series of magazines each containing spaces of uniform
25 width, the spaces in each magazine differing from the spaces in adjacent magazines by approximately the same amount, combined with mechanism for supplying the line with true spaces from one or more of said magazines, of the proper size and number to
30 justify the line.
- 35 23. In an organized machine for justifying a composed line of type, a series of inclined plates, each plate differing in altitude from the adjacent plate by the same arbitrarily-selected increment, with a series of space-magazines each containing spaces of the same
40 width, the spaces in adjacent magazines differing from one another by approximately the same amount, a space-selecting device for supplying the line to be justified with true spaces selected from one or more of said
45 magazines, and connections between said series of plates and said device, whereby said device is properly set for each line to be justified.
- 50 24. In an organized machine for justifying a composed line of type, a series of inclined plates, each plate differing in altitude from the adjacent plate, by the same arbitrarily-selected increment, a space-selecting device for
55 supplying the line to be justified with true spaces and connections between said series of plates and said device, whereby said device is primarily set for each line to be justified, combined with means for moving said device from the position in which it is so set to cause it to select the proper combination of spaces to justify the line.
- 60 25. In a mechanism for justifying a composed line of type, the combination of the device for measuring an unjustified line to ascertain the difference between the length of the set line and standard, means set by the
65 measuring device to establish a point a dis-

tance from a certain fixed point proportional to said difference, and a series of inclined plates, each plate differing in altitude from its adjacent plate by the same arbitrarily-selected increment, the plates being adapted to be thrust between said two points, and a mechanism connected to the plate selected and adapted when set by the setting of the plate to supply true spaces, which will justify the line. 70

75 26. An instrument for justifying type consisting of an inclined surface, the tangent of which is arbitrarily selected to indicate a fixed number of spaces, the inclined surface being laid off in accordance with a scale empirically arranged to read at any selected point, the
80 width of the space, which, multiplied by the number of spaces indicated by the angle of the inclined surface will be equal to the width of the inclined surface at the selected point. 85

90 27. A device for justifying type which consists of a series of inclined surfaces, each surface differing in altitude from its adjacent surface in the series by an arbitrarily-selected but uniform degree, each surface corresponding to the number of works in the line for which that surface is designed to be used, each surface being laid off in accordance with a uniform empirically-selected scale, which
95 when one of the series of surfaces is inserted between two fixed points will read at the point of contact, the width of the space, which, multiplied by the number of spaces in the line, to which the particular surface corresponds, will equal the width of the particular surface used at the point of contact, combined with a line-measuring and space-determining device. 100

105 28. In a device for justifying type, the combination of means for measuring the length of a set line to determine the difference between the length of the set line and standard, means controlled by the measuring device to set a point a distance from a certain fixed point, proportional to the said difference, a series of inclined surfaces, each surface differing in altitude from its adjacent surface in the series, by an arbitrarily-selected but uniform degree, each surface corresponding with the number of words in the
110 line for which the surface is designed to be used, and being laid off in accordance with a uniform empirically-selected scale, which when any one of the series of surfaces is inserted between said two fixed points will read or register at the point of contact, the width
115 of the space, which, multiplied by the number of spaces in the line, to which the particular surface corresponds, will be equal to the difference between the line as set and standard. 120 125

BENJ. M. DES JARDINS.

Witnesses:

CARL J. DIETRICH,
ISAAC A. ALLEN, JR.