E. M. v. MARCHTHAL.

JUSTIFICATION INDICATOR,

APPLICATION FILED JULY 11, 1913.

1,183,997.

Patented May 23, 1916.

4 SHEETS—SHEET 1.

Fig. 1.

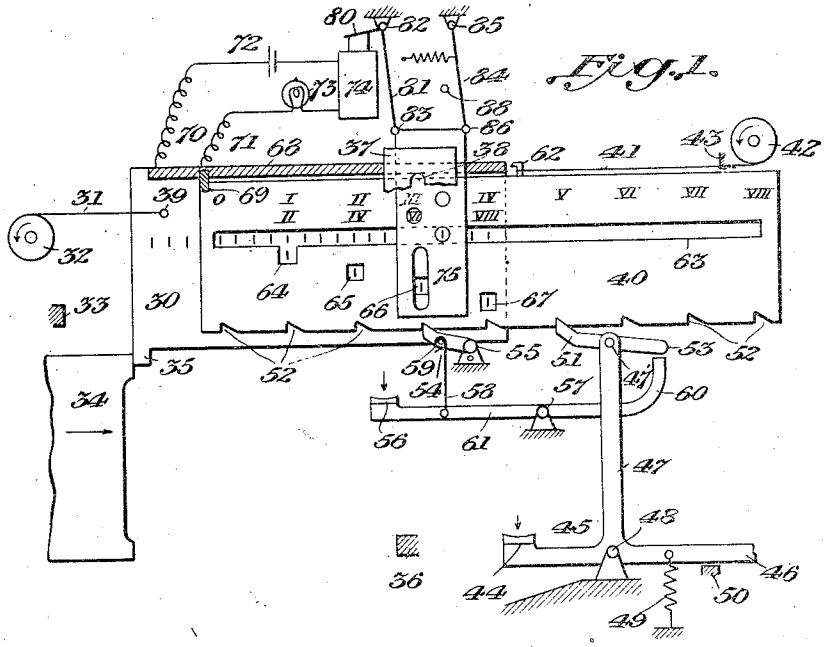



Fig. 2.

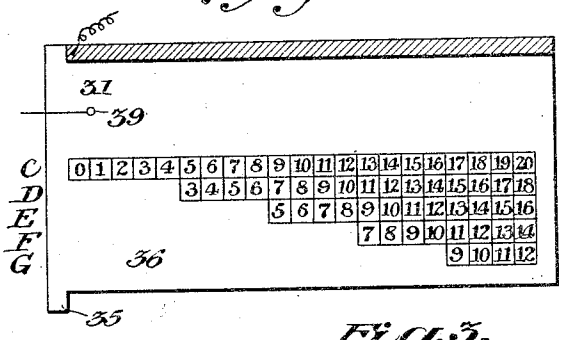



Fig. 4.

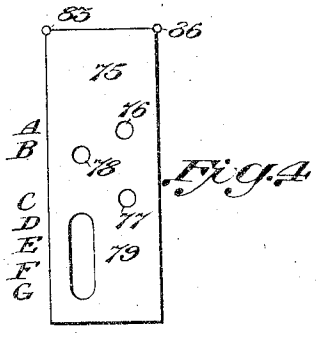
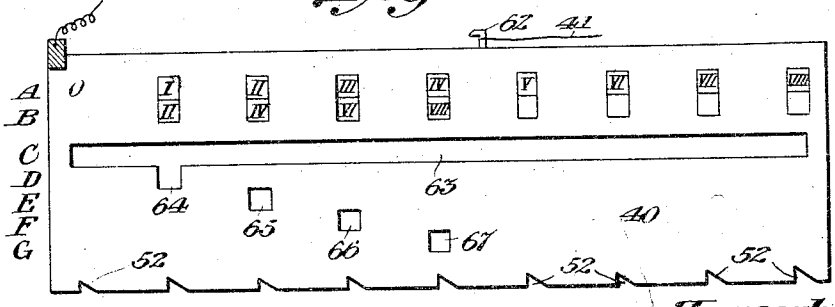



Fig. 3.




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4 SHEETS—SHEET 2.

Fig. 6.

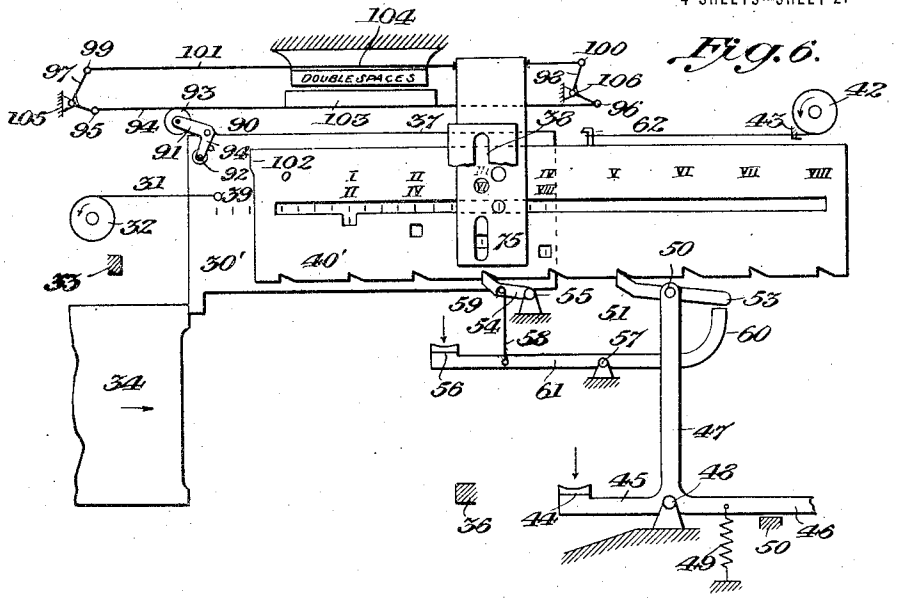



Fig. 7.

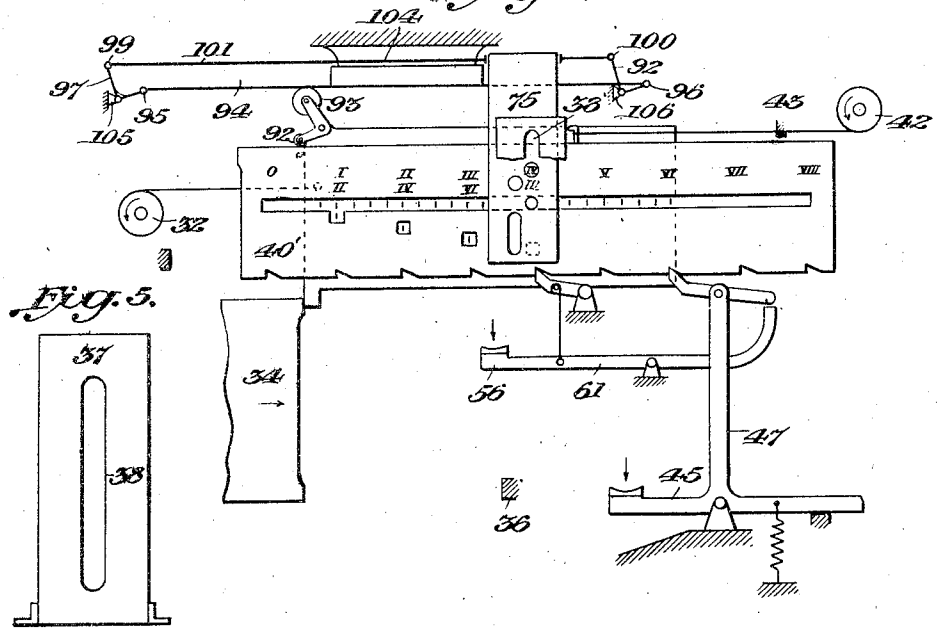



Fig. 5.




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4 SHEETS—SHEET 3.

Fig. 3.

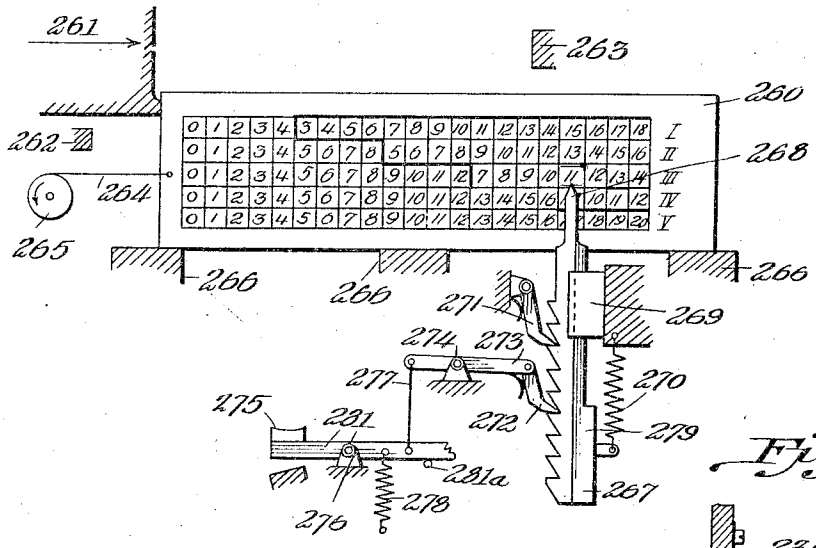
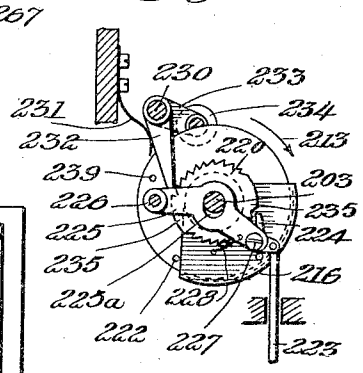



Fig. 13.



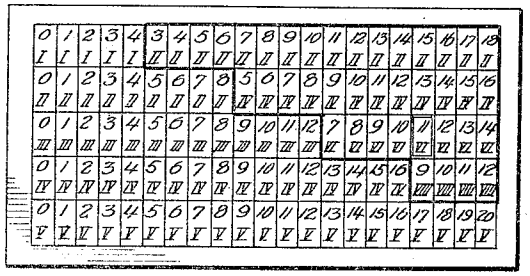



Fig. 9.

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E. M. v. MARCHTHAL.

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4 SHEETS—SHEET 4.

Fig. 12.

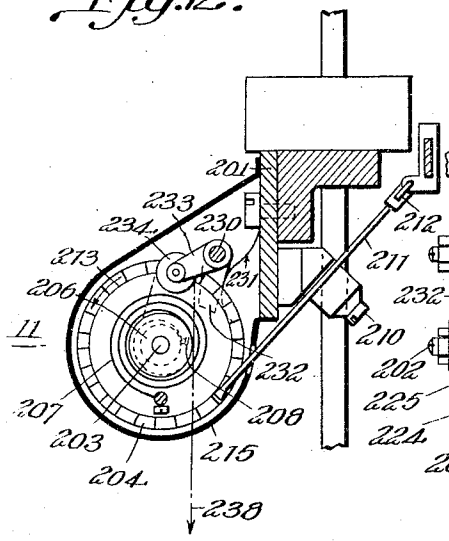



Fig. 10.

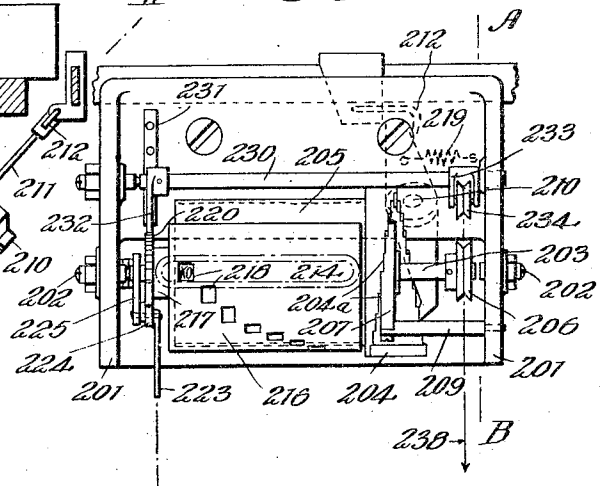
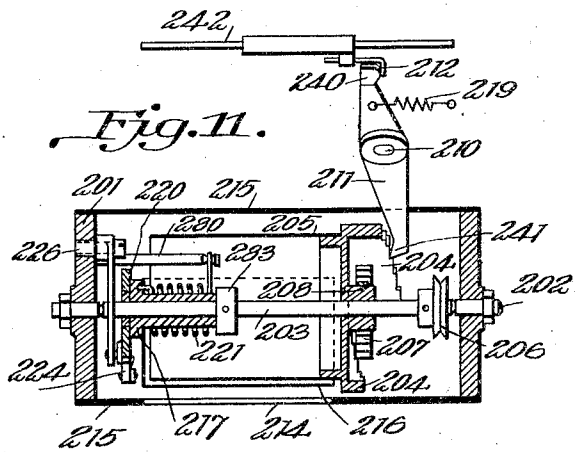



Fig. 14.

205

| II | III | IV | V | VI | VII | VIII | IX | |
|---|---|---|---|---|---|---|---|---|
| K· | VQ | CJ | XH | VH | FH | CH | RH | 28 |
| KV | VX | CK | XC | VC | FC | CC | RC | 27 |
| KZ | VY | CW | XO | VO | FH | CO | RO | 26 |
| KQ | VJ | C· | XL | VL | FL | CL | RL | 25 |
| KX | VK | KF | XF | VF | FF | CF | RF | 24 |
| KY | VW | KP | XP | VP | FP | CP | RP | 23 |
| KJ | V· | K· | X· | V· | F· | C· | R· | 22 |
| KK | VB | KV | XV | VY | FV | CV | RV | 21 |
| KW | VD | KZ | XZ | VZ | FZ | CZ | RZ | 20 |
| K· | VN | KQ | XQ | VQ | FQ | CQ | RQ | 19 |
| KO | BX | KX | XX | VX | FX | CX | RX | 18 |
| KO | BY | KY | XY | VY | FY | CY | RY | 17 |
| KM | BJ | KJ | XJ | VJ | FJ | CJ | PJ | 16 |
| KG | BK | KK | XK | VK | FK | CK | RK | 15 |
| KU | BW | KW | XW | VW | FW | CW | RW | 14 |
| KT | B· | K· | X· | V· | F· | C· | R· | 13 |
| GB | BB | KB | XB | VB | FB | CB | RB | 12 |
| GD | BD | KD | XD | VD | FD | CD | RD | 11 |
| GM | BM | KM | XM | VM | FM | CM | RM | 10 |
| GG | BG | KG | XG | VG | FG | CG | RG | 9 |
| GU | BU | KU | XU | VU | FU | CU | RU | 8 |
| GT | BT | KT | XT | VT | FT | CT | RT | 7 |
| GS | BS | KS | XS | VS | FS | CS | RS | 6 |
| GN | BN | KN | XN | VN | FN | CN | RN | 5 |
| GE | BE | KE | XE | VE | FE | CE | RE | 4 |
| GI | BI | KI | XI | VI | FI | CI | RI | 3 |
| GR | BR | KR | XR | VR | FR | CR | RR | 2 |
| GA | BA | KA | XA | VA | FA | CA | RA | 1 |

Fig. 11.




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# UNITED STATES PATENT OFFICE.

EDUARD MAREK v. MARCHTHAL, OF VIENNA, AUSTRIA-HUNGARY, ASSIGNOR TO SIEMENS & HALSKE A. G., OF BERLIN, GERMANY, A CORPORATION OF GERMANY.

## JUSTIFICATION-INDICATOR.

1,183,997. Specification of Letters Patent. Patented May 23, 1916.

Application filed July 11, 1913. Serial No. 778,535.

*To all whom it may concern:*

Be it known that I, EDUARD MAREK VON MARCHTHAL, a subject of the Emperor of Austria-Hungary, and resident of Vienna, Austria-Hungary, have invented certain new and useful Improvements in Justification-Indicators, of which the following is a full and clear specification.

The invention is illustrated in the accompanying drawings and more fully stated in the annexed claims.

In machines which produce printed matter with justified lines each line is first composed irrespectively of its exact length. The operator has generally the order to break the line before it has reached its normal length. The space which such line is too short I shall hereinafter call the "blank space" and such blank space divided by the number of intervals between the words on the line which are called "spaces" in the art is equal to the amount which each space must be enlarged to bring the line to its standard length. Such enlargement of the spaces, however, is limited by the construction of the machine so that it may happen that the blank space is too large to be justified completely by the available spaces. This defect can be remedied by using larger than normal spaces; for instance without particular arrangement it may be done so that each word may be separated by two spaces instead of one ordinary space.

The present invention refers to a device for indicating the blank space and the number of spaces, and for indicating not only whether the blank space may be justified with the number of available spaces but for indicating also how much blank space is left when larger than normal spaces are used. By such means it is not necessary for the operator to write the line once more in order to ascertain how much blank space is left when larger than normal spaces are used.

One of the machines in which my justification indicator is employed is of the type in which a perforated symbol strip is produced by the operator, which strip is subsequently fed into the machine which produces the actual printed matter. In such symbol strips not only the symbols for the letters themselves are perforated, but also certain symbols which control the spacing devices, which latter symbols are generally put at the head of the line to be written by suitable arrangement of the paper strip, so that the spacing symbols reach the type-setting machine first before the letter symbols of that line become operative. By such arrangement the spacing devices are set beforehand for that particular line. Machines for producing such symbol strips have been described for instance in my Patents No. 1,067,047 of July 8th, 1913, and No. 1,082,642, of December 30, 1913. The particular construction of the machine disclosed in said application is immaterial for the understanding of the present invention, and a machine for perforating a controller strip has been chosen as an example merely to show that my novel device is capable of application to any machine for composing or producing printed matter in symbols or otherwise, in which a carriage or some equivalent letter spacing means is provided which is actuated while the composed line progresses, the control of the justification indicator, as will be described later on, depending upon the operation of such letter spacing means. Therefore the present invention is applicable as well to a machine referred to in the above mentioned application, as also directly to type setting or casting machines or also to typewriting machines or the like, all of which machines are provided with letter spacing means such as carriages or indicators, by which the progress of the written line may be observed. In all of such machines my novel indicator in the forms shown and described, tells the operator the necessary justification, irrespectively of the means by which the operator subsequently may bring about such justification in the particular machine.

In order to be really useful to the operator the above mentioned justification indicator must be constructed so that when for instance the symbol strip is fed into the type-setting or type-casting machine as the case may be, and the space symbols become operative they must be able if desired to also cause the machine to set double spaces, though in the strip itself symbols for only single spaces are made by the operator. The machine which the operator controls is therefore constructed so that a certain hole symbol is subsequently made in the strip by the operator at the beginning of the line which controls the mechanism set for cer-

tain spaces by the space symbols, so that it responds twice to one space symbol in the symbol strip. The mechanism by which this result is obtained has no bearing on the present invention and its illustration and description has been therefore omitted. It has been referred to, however, merely so as to indicate to those skilled in the art how my device might be employed in practice.

In the accompanying drawings several modifications of my invention are illustrated.

Figure 1 is a diagrammatical illustration of a modification in which the indication for single and double spaces is controlled electrically; Figs. 2 to 5 illustrate single elements of this modification in larger scale to be referred to later on; Figs. 6 and 7 show a second modification in two operating positions in which the indication, whether single or double spaces are to be used, is controlled mechanically; Fig. 8 is a diagrammatical illustration of another modification in which a pointer is made use of for indicating the amount of justification; Fig. 9 is a more practical table which may be used in the modification shown in Fig. 8; Figs. 10 to 14 show a practical form of the modification shown in Fig. 8, and of these figures,—Fig. 10 shows a front view of the device with the protecting casing (215 Fig. 12) removed; Fig. 11 shows a horizontal sectional view on the line 11—11 (Fig. 10); Fig. 12 shows the sectional view on the line A—B in Fig. 10; Fig. 13 is a left side elevation of Fig. 10, and Fig. 14 shows the surface of the justification cylinder 205 developed into a plane surface.

The modification shown in Fig. 1 is designed for a machine in which the size of each single space amounts to two units, each of which for justification purposes may be enlarged four units. The largest blank space which is permitted for justification is 20 units. The amount of blank space left at the end of a line is indicated by the blank space slide 30. This slide is horizontally movable and abuts in its resting position against a stop 33 near its left hand end. A cord 31 wound on a spring controlled drum 32 and fastened at 39 to the slide 30 tends to hold the latter against stop 33. If now the carriage 34 or some equivalent letter spacing means of the writing machine has traveled within 20 units to its extreme right hand position it abuts against a nose 35 of the blank space slide 30 and carries the latter with it on further movement to the right until the carriage abuts against its stop 36, by which the carriage movement is limited. In the claims I shall call the carriage the letter spacing element.

As may be seen from Fig. 2 which shows a separate view of the blank space slide in large scale, a row of numerals reading from 0 to 20 is written which is marked C in Fig. 2. In Fig. 1 the readings of slide 30 are merely indicated by single lines. A shield 37 shown partially broken away in Fig 1 but shown in full view in Fig. 5, is mounted stationary in front of slide 30 and is provided with a reading window 38 behind which the several readings appear, as will be described presently. When carriage 34 just touches slide 30 when the line is nearly completed, this slide still stands in its initial position abutting against its left hand stop 33, and in the window 38 then appears numeral 20 of the numeral row C, which means that the written line is still 20 units short. When the carriage 34 has traveled to its stop 36 the numeral 0 appears in window 38, because the slide has been taken along by the carriage 20 units and this indication means that the blank space is 0, in other words, that the line has its full standard length. The other numeral rows D, E, F, G, which appear on the slide shown in Fig. 2 indicate the size of the blank space in units which the line would have were it written with double spaces. Row D is used for a line in which only one space is justified. If this space is doubled the blank space is made one space smaller thereby. Therefore the numerals of row D are short the size of one space, (that is to say, two units) over the row C, (row D is 18 units, while row C is 20 units). Row E shows the blank space when double spaces are being used in case two spaces are justified in a line. When these two spaces are doubled the blank space becomes two spaces (4 units) smaller. Therefore the row E runs to a number which is four smaller than row C. Correspondingly, rows F and G are used for lines in which three and four spaces respectively are justified.

Since as stated before, one space can be enlarged four units, a line in which only one space is to be justified a blank space of four units can still be justified. Therefore double spacing need not be considered in this case. For this reason the numerals of row D only commence under numeral 5 of row C. Likewise, in rows E, F and G only such numerals are marked which are actually used.

When the operator finds at the end of a line that it cannot be justified with the amount of spaces available and that he therefore must double all the spaces he can read the blank space which would be left, in case double spaces are used throughout the line, from the rows D, E, F, G. For instance, if in the line only one word space is justified he should use the readings of row D which appear in window 38, if two word spaces are to be justified the readings of row E, and so on. In order to relieve the operator from deciding which of these readings he should take, the device also pro-

vides that all readings which should not be considered are covered up. These means are embodied in a particular form of indicator slide 40.

As shown in Fig. 1 the indicator slide 40 is located in front of the blank space slide 30, so that it partially covers it. A cord 41 is fastened to slide 40 at the stop 62, which is wound on a spring controlled drum 42. In the normal position slide 40 rests with its stop 62 against stop 43. The slide is capable of advancing to the left one step at each word space. This movement is obtained in the modification shown in Fig. 1 by means of space key 44. This space key is attached to the arm 45 of a three-armed lever, the other arm 46 of which is broken off but serves for controlling the mechanism which advances the carriage. This mechanism having no bearing on the present invention has been omitted from the drawings. A spring 49 attached to arm 46 holds the latter normally against top 50. The third-arm lever 47 carries at its end 47′ a pawl 51 which engages the teeth 52 provided at the lower edge of slide 40. When key 44 is depressed pawl 51 feeds the indicator slide 40 one tooth to the left. The slide is held in its advanced position by means of retaining pawl 54 which is pivoted in the stationary pivot 55. When it is desired to return the slide to its right hand end position key 56 is depressed. This key is attached to one end of a two-armed lever which swings on the pivot 57. Arm 61 of this lever has connected to it pull rod 58 which, at its other end is connected to pin 59 of retaining pawl 54 to operate the latter. The other arm 60 is turned upward at its end so that when key 56 is depressed this upturned end strikes the rearward extension 53 of pawl 51 whereby the latter is disengaged from teeth 52 simultaneously with retaining pawl 54, so that in turn slide 40 can fly to the right under the control of spring drum 42.

Indicator slide 40 is shown in Fig. 3 in large scale. It has marked on its surface in row A the numeral 0 and the numerals I to VIII which, when the slide is gradually advanced to the left appear one after the other in the reading window 38 shown in Fig. 5 and previously referred to. Underneath row A roman numerals of double the value are marked; these numerals stand for double spacing. Indicator slide 40 has a long slot 63 underneath rows A and B, and in parallel thereto which permits through it the reading of row C of slide 30. Besides, the slot 63 has a downward extending cut-out 64 which is in line with the space indication I of row A, so that any numeral of row D of slide 30 may appear in this cut-out. In a vertical line with space indication II of row A and at the height of row E of slide 30 a window 65 is provided in slide 40, which permits any of the numerals of row E to appear therein. Similarly, windows 66 and 67 are arranged in slide 40 in line with space indications III and IV, so that the numerals of rows F and G respectively of slide 30 may be read through them. For instance, if a line has four spaces which should be justified and a blank space of 19 units, there will appear in window 38 the numerals $\frac{IV}{VIII}$ of indicator slide 40, and through the window 63 and 67 of the latter the units indications 19 and 11 which are marked on blank space slide 30. Thereby the indications IV and 19 stand for single spaces, whereas VIII and 11 stand for double spaces. My improved indicating device also contains means for permitting the appearance of only those two of the previous mentioned four readings which the operator should use. The other two readings are covered up by means of a movable shield 75 (Figs. 1 and 4). This shield has three round windows 76, 77 and 78 and a long vertical window 79. When the shield 75 is in its normal position its windows 76 and 77 are in line with window 38 previously mentioned, whereby windows 76 and 77 are also in alinement with rows A and C of slides 40 and 30 respectively. Accordingly, all other rows of the two slides are covered up. If it should not be possible, now, to justify the line with single spaces shield 75, by means to be described hereafter, is moved into its shifted position, in which windows 78 and 79 are in alinement with window 38, so that only the readings of rows B, D, E, F, G are readable therethrough.

In order to shift shield 75 into one or the other of the two above mentioned positions the following device is provided: The distance between the space indications 0, I, II, etc., on slide 40 and accordingly the space between the teeth 52 on the lower edge of that slide has a certain fixed value. This value is such that when both slides 30 and 40 stand relatively to each other so that their 0 indications register, the blank space indicated by the values 0, 1, 2, 3, etc., of slide 30, which can still be justified with the single space number available, appear under each space indication 0, I, II, III. If now slide 30 stands even one single unit to the left, blank space values will appear under each of the space indications I, II, III, etc., which cannot be justified. Therefore, in all positions of the two slides, in which the 0 indication of slide 30 stands to the left of the 0 indication of slide 40, the line is not justifiable with single spaces; the justifiability therefore may be observed on the relative position of the two slides and therefore the position of the shield 75 must be dependent upon the relative position of

the two slides. This dependency may be brought about in numerous ways. For instance, in Fig. 1 an electrically controlled device is shown, whereas Figs. 6 and 7 show a mechanically controlled device. The arrangement in Fig. 1 comprises a contact rail 68 fastened to the upper edge of slide 30 and a contact shoe 69 attached to the left hand upper corner of slide 40. When the line is not justifiable with single spaces, that is to say, when the left hand end of slide 30 protrudes beyond the left hand end of slide 40, contact is made between shoe 69 and rail 68, whereby a circuit is closed from battery 72, flexible conductor 70, rail 68, shoe 69, flexible cord 71, signal lamp 73, electromagnet 74 back to the battery. Lamp 73 then flashes up and thereby indicates to the operator that double spaces are necessary for the justification of the line. Electromagnet 74 energized at the same time attracts its armature 80 which forms one arm of bell crank 80, 81 pivoted at 82. Arm 81 is pivotally attached at its free end 83 to the left hand corner of shield 75, whereas a rod 84 running in parallel to arm 81 and attached to stationary pivot 85 at one end, is attached at its other end 86 to the right hand corner of shield 75. A spring 87 fixed at one end is attached at its other end to rod 84 so that this parallel link movement always tends to hold shield 75 in its left hand or normal position, in which as described before, its windows 76 and 77 are in line with window 38. When the electromagnet 74 is energized and has attracted its armature 80 as described before, the shield is thrown to the right as illustrated in Fig. 1 where its windows 78 and 79 come in line with window 38. When the operator commences to write a line, blank space slide 30 abuts against its stop 33, whereas space indicator slide 40 abuts with its nose 62 against stop 43. The contacts 68 and 69 touch each other and the flashing of the signal lamp 73 announces to the operator that the line is not yet justifiable with single spaces. When now the slide 30 is carried to the right by carriage 34 during the writing of the line and when at the same time slide 40 is fed to the left by means of space key 44 a sufficient distance to interrupt the circuit at the contact elements 68 and 69, the signal lamp goes out and at the same time shield 75 moves from its left hand position to the right into its normal position. When the operator has finished the line and has read the blank space and the number of spaces to be justified he depresses key 56, which if desired may at the same time serve the function of releasing the carriage (mechanism not shown). By depressing key 56 pawls 51 and 54 are released and slide 40 is returned to the right under the influence of spring drum 42. Slide 30 returns together with carriage 34 to the left under the influence of spring drum 32 and the entire indicating mechanism is thereby set for a new line.

In Figs. 6 and 7 the dependency of the signal for "double spaces" and of the movement of shield 75 from the relative position of the two slides is brought about by mechanical means. The blank space slide 30′ in these figures carries at its upper left hand corner a pivot 90 which supports a bell crank 91. The bell crank carries the rollers 92 and 93 at the respective ends of its two arms, and the bell crank is over-balanced by roller 93 so that its lower arm normally abuts against a stop 94 provided on slide 30′. While slide 30′ is fed to the right by carriage 34, as previously described, roller 93 rolls along a rail 94, the ends of which 95 and 96 are pivotally attached to the two bell cranks 97 and 98 respectively. The two latter bell cranks are pivoted at 105 and 106 respectively, and have their other arms 99 and 100 respectively connected by rail 101, so that the two bell cranks with rails 94 and 101 form a parallel link movement. When now the left hand upper corners of slides 30′ and 40′ approach each other the corner 102 of slide 40′ strikes against roll 92 of bell crank 91 and thereby throws it upward into the position shown in Fig. 7, so that now roll 92 will travel along the upper edge of slide 40′ on further movement of the latter to the left of slide 30′ to the right. By such movement of the bell crank its roll 93 has thrown up rail 94 on which a small shield 103 is fastened. This shield in the position of the elements as shown in Fig. 6, leaves a fixed sign 104 "double spaces" uncovered. On the other hand in the position of rail 94 described just before and shown in Fig. 7, this shield 103 covers up the sign 104. By this the operator is informed that the line is justifiable with single spaces. At the same time rail 94 is thrown up by roller 93, rail 101 is shifted to the left and thereby also carries shield 75 attached to it to the left, so that the shield is shifted into its normal position similar to the one which it has when in Fig. 1 the electromagnet 74 releases its armature 80. The shifted position of shield 75 is shown in Fig. 7.

In Figs. 8 to 14 inclusive, I have shown a more simplified form for obtaining the same results as are obtained with the apparatus described hereinbefore. Figs. 8 and 9 show the simplest form in more or less diagrammatical manner, whereas Figs. 10 to 14 show the preferred form which is applied to a certain type composing machine referred to in my aforesaid patents.

Referring to Fig. 8 a justification indicating device is shown for a machine in which the value of a normal word space amounts

to two units which may be enlarged the value of four units for justification purposes. The justification values are tabulated on a slide 260 which is horizontally movable on the supports 266, and is controlled similarly to the slide 30 shown in Fig. 1 by means of a spring controlled drum 265 and a cord 264, by which latter two elements the slide tends to rest against its stop 262. As soon as the machine carriage or letter spacing element 261 approaches its right hand end position it abuts against slide 260 and takes it along to the right. The extreme right hand position of the carriage is fixed by stop 263. The tabulation of slide 260 contains five rows of numerals I to V, each of which rows stands for the number of word spaces over which the justification is to be distributed. In Fig. 8 the numbers I to V appear at the right hand end of the table. Accordingly, in this form only the first five spaces are counted for justification; if more than five spaces should take part in the justification further rows must be added. The numeral which the operator should read, to learn about the justification is indicated by a pointer 268, which forms a part of a vertical slide 267. This slide is mounted in a guide 269 so that when it is in its lowermost position pointer 268 indicates any of the numerals contained in row V which indicate the blank space in units. If, in this position slide 260 still rests against its stop 262 the pointer indicates the numeral 20 which indicates the largest blank space which can be indicated and still be justified. When the carriage 261 has reached its right hand end position and abuts against stop 263 pointer 268 shows the blank space O. Slide 267 rests at the beginning of a line with its stop 279 and under the influence of spring 270 against guide block 269, whereby pointer 268 stands above any of the rows of the table. Slide 267 is provided with teeth which coöperate with a pawl 271 mounted on a stationary pivot, and the teeth also operate with a pawl 272 which is pivotally mounted on a two-armed lever 273. The lever is pivoted at 274 and connected at its other end with lever 281 of the space key 275 by means of a pull rod 277. Space key lever 281 is pivoted at 276 and is held in normal position against stop $281^a$ by means of a spring 278. When key 275 is depressed a word space is produced by a mechanism not shown here; at the same time through rod 277, lever 273 and with it feeding pawl 272 is moved, so that pawl 272 is thrown downward whereby slide 267 is lowered one tooth. The slide is held in this new position by means of retaining pawl 271, while the space key 275 under the influence of spring 278 returns into its resting position, in which pawl 272 engages the next higher tooth of the slide. Therefore at each depression of the space key slide 267 moves one step downward, so that its position corresponds with the number of written spaces, which can be read by reading the roman numeral of the row to which the pointer points.

Since each space may be enlarged only four units the line must have a certain minimum amount of spaces in order to enable the operator to still justify the blank space by such enlarging of the available spaces; if on the other hand the blank space should amount for instance to 17 units, whereas only three spaces are in the line, it cannot be justified any more since the spaces cannot be enlarged $17 \div 3 = 5\frac{2}{3}$ units. Now on the tabulation of slide 260 all blank space values which cannot be justified in the number of spaces which their row indicates in roman numerals are encircled by a heavy line, so that when pointer 268 indicates one of the numerals in any of the rows located within the black encircled field, the operator is informed that the line is not justifiable with ordinary spaces. He will then operate a certain key of the composing mechanism (not shown here) which for this instance is assumed to be of the type referred to above. By the operated key a particular hole symbol is produced in the symbol strip which causes the reproducing mechanism which is controlled by the perforated strip to produce a double space for each single space symbol in the paper strip. Thus a double space is made between each two words. Now according to the above given example the line would have, when written with double spaces, six spaces and is therefore justifiable, since by the enlarging of the line an amount of three spaces the blank space has been reduced $3 \times 2 = 6$ units and amounts now to only 11 units. This blank space of 11 units must be distributed over six spaces and the operator should now provide the hole symbols in the strip for these values. In order to save the operator any calculation, the values on the table which are located within the black encircled field do not indicate the actual blank space in units but the blank space which exists after the spaces have been doubled. Accordingly, in the above given example of a line with three spaces and an actual blank space of 17 units, pointer 268 does not point to numeral 17 but to numeral 11 in row III, as shown in Fig. 8.

Fig. 9 shows a further improved tabulation. It is used with the same mechanism as shown in Fig. 8. In this improved table the values of the number of justifiable spaces are not indicated each at the right hand end of the row of blank space values to which it belongs, but the values of the justifiable spaces are repeated underneath each blank space value. Within the black

encircled field in each instance double the number of spaces are indicated instead of the actual number of word spaces, so that the operator is enabled to directly read the space number which he should mark in the symbol strip. For instance, for the same example chosen above with reference to the tabulation shown in Fig. 8 the indication of the pointer in Fig. 9 would stand on the black encircled rectangle $\frac{II}{IV}$ in the latter figure. This improved tabulation is of great value for the operator particularly when the ordinary letter keys of the writing or punching machine are used for producing the symbols for the blank space and the number of spaces over which the former is distributed. In this case the table does not contain numerals but instead the letter or letters of the key, which must be depressed in order to produce the justification of a certain blank space at a certain number of word spaces. The table illustrated in Fig. 14 shows a tabulation according to letters. Of course, in order to particularly emphasize to the operator that for certain indications he should use double spaces and produce symbols in the strip in accordance therewith, all the letters or numerals, whichever may be used of the two, which are located in the black encircled field in either Figs. 8, 9 or 14, may be printed in a different color. It is of course obvious that instead of using numerals or letters as shown, any other symbols, for instance those which the operator should produce in the paper strip, may be marked instead.

A further modification which I preferably employ in a certain machine for producing printed matter is shown in Figs. 10 to 14. In the frame 201 (Figs. 10 and 11) is a shaft 203 journaled between the screw centers 202, 202. This shaft carries a tabulation or reading drum 205, the cord pulley 206 and a crown cam 204 with steps $204^a$ arranged to intersect with a helical curve. A spiral spring 207 fastened at its inner end to the pin 208 of the crown cam and at its outer end to a fixed support 209, tends to rotate cam 204 together with drum 205 in the direction of the arrow 213 (Figs. 12 and 13). Ordinarily such rotation is prevented by a double armed lever 211 rotatable on a pivot 210 and held in engagement at its nose 241 with the steps of the crown cam by means of spring 219 (Fig. 11). Normally the drum stands so that the nose 241 engages the lowest step of the crown cam. A pull rod 242 which is connected with the machine carriage or letter spacing element (not shown) carries a finger 212 which when the carriage approaches the end of the line engages with the free end 240 of lever 211, so that on further movement of the carriage to its extreme end position it takes the upper end of lever 211 along. By this movement nose 241 moves away from crown cam 204 at each step of the paper carriage the height of one step $204^a$ of the crown cam (which height corresponds with one space unit) so that the reading drum 205 is permitted to rotate the peripheral length of one step $204^a$ of the crown cam 204 in the direction of the arrow shown in Figs. 12 and 13.

On the reading drum 205 a tabulation is provided which is shown in the rectangular plane in Fig. 14, and these justification readings may be observed through a long slot or window 214 (Figs. 10 and 11) which is provided in the protecting casing 215. In Figs. 10 and 13 the device is shown without the protecting casing 215, but the slot 214 is marked in dotted lines in Fig. 10 to show its exact location. Between casing 215 and drum 205 is disposed a shield 216 (Figs. 10, 11 and 13), which is attached to a hub 217 loosely mounted on shaft 203 and prevented from lateral movement by a collar 283. Shield 216 has a number of windows 218 (Fig. 10) arranged on a helix so that when the shield is rotated its windows successively appear in the window slot 214, whereby a numeral of each of the peripheral rows II to IX (Fig. 14) successively appears to the observer in one of the windows 218. The hub 217 which carries shield 216 also carries a ratchet wheel 220 and a torsion spring 221 (Fig. 11) which tends to move the hub in the direction of the arrow 213 (Fig. 13). The other end of torsion spring 221 is fastened on a pin 280 fixed in casing 201. In normal position (as shown in Fig. 13) the shield rests under the tension of the torsion spring against a pin 222. The ratchet wheel 220 and with it shield 216 may be turned step by step in the direction against arrow 213 by means of a feeding pawl 224 which is pivotally attached to the free end of a lever 225, the other end of which is pivoted on the stationary pivot 226. Shaft 203 passes through an oblong opening $225^a$ of this lever so that the latter can rock a certain distance upward. Lever 225 is held in the position shown in Fig. 13 by means of a spring 228. Feeding pawl 224 is normally held out of engagement with the ratchet wheel 220 as shown by means of a connection with a push rod 223 which is connected with the space key (not shown) so that when the latter is depressed the rod is pushed upward through which the pawl 224 is thrown first into engagement with the tooth standing in its path and then lever 225 is rocked upward, by which latter motion the ratchet wheel 220 is moved one tooth against the direction of the arrow 213. A retaining pawl 232 holds ratchet wheel 220 in the new position into which it has been rotated by the movement of the

feeding pawl just described. By this feeding movement it will be noted shield 216 is fed one step against the direction of the arrow at each depression of the space key, in other words for each space written by the operator. In the device described here not more than nine spaces should be counted between which the justification can be distributed, and therefore the shield should be rotated only nine steps, for which purpose only nine teeth are provided for the feeding pawl and accordingly for the retaining pawl. The remainder of the ratchet wheel 220 is not provided with teeth as shown at 235, which prevents the further movement of the ratchet wheel 220 after the ninth word space has been written. In Fig. 10 the shield 216 is shown in a position advanced by two steps. Not until it has taken up this position the first of the windows 218 is in line with the long slot 214 which means that the space number 1 is not indicated at all. As any written line is expected to have at least two spaces the indication of the first word spaces is unnecessary.

After all the justification symbols have been written by the operator after he has finished a line and after the paper carriage of the machine with its finger 212 has been removed to the right in Fig. 11, so that the end 240 of lever 211 has been released thereby, the entire justification indicating mechanism should be returned to its normal position ready to indicate the justification during the writing of a new line. This may be brought about by the pulling of a cord or by any suitable mechanism connected with the composing machine. As an example, I have shown here how this mechanism may be reset by hand by means of a cord. One end of a cord 238, marked in Figs. 10 and 12 in dot and dash lines, is fastened to the cord pulley 206 and wound with several turns on this pulley. Thence the cord passes over roll 234 which is journaled at the end of a lever 233 fastened on the shaft 230 on which also the previously mentioned retaining pawl 232 of ratchet wheel 220 is fastened. When now cord 238 is pulled, first roll 234 is pulled downward and thereby rocks shaft 230 which in turn disengages retaining pawl 232 from its ratchet wheel 220. Thereby the ratchet wheel under the influence of torsion spring 221 returns with its shield 216 into its normal position shown in Fig. 13. The pawl 232 then rests against a stop 239 fixed in casing 201. Upon further pulling cord 238 shaft 203 is turned against the direction of the arrow in Figs. 12 and 13 and against the tension of spring 207 until the reading drum 205 stands in its 0 position. During this return the nose 241 of lever 211 slides from the highest step of the crown cam over all the steps down again to the lowest step where it stood when the previous line was started.

In the indication table in Fig. 14 which represents the cylindrical surface of the reading drum 205, the indications for the blank space values appear in vertical rows (which correspond with peripheral rows on drum 205). This indicating table is used in a composing machine in which the normal word space amounts to three units and in which it can be enlarged six units. The entire indicating mechanism measures a blank space up to 28 units and a number of spaces, over which a blank space may be distributed, of from two to nine spaces. Therefore altogether eight vertical rows for 2, 3, 4 . . . 9 spaces, (rows II to IX), and each row contains 28 reading squares. In each square two letters are marked, the first letter stands for the number of spaces, the second letter stands for the value of the blank space. All blank spaces for which justification is impossible with single spaces are, similarly to the manner shown in Fig. 8, encircled by a heavy line. In the actual apparatus they may be marked by a different color. If now, the reading drum 205 moves in the direction of the arrow owing to the operation of lever 211 by the paper carriage, all the squares of one of the vertical rows which might be visible through one of the reading windows 218 which stands in line with the large reading window 214 appear one after the other in this window. If now by a depression of the space key shield 216 is moved one step against the direction of the arrow 213, the readings of another vertical row of the table will appear in the large window through another small reading window 218. For example let us assume that a line contains three spaces and has a blank space of 20 units. Then the spaces may be enlarged $3\times6=18$ units, which, however, is not sufficient to justify a blank space of 20 units. Therefore the spaces must be doubled to six spaces, whereby the blank space is lessened three spaces or $3\times3=9$ units. In other words, the blank space has been reduced from 20 to $20-9=11$ units. In the square located in the vertical row III and the horizontal row 20, the letter V stands for 6 spaces and letter D for 11 units. This square being located within the black encircled field the operator is reminded that he should provide in his symbol strip a further hole symbol which causes the writing of double spaces.

What I claim is:

1. A justification indicator of the character described having means for indicating the actual blank spaces and means for simultaneously indicating the blank space which would be left if the total amount of word spaces of the same written line were enlarged a predetermined amount.

2. A justification indicator of the character described having means for indicating the actual blank spaces and word space numbers over which the blank space is to be distributed, and means for simultaneously indicating the blank space, which would be left if the total number of spaces of the same written line were enlarged a predetermined amount, and means for indicating whether the normal or enlarged word spaces should be used in the line.

3. A justification indicator for type composing machines or the like, having a blank space slide controlled by the letter spacing element of the composing machine, said slide having a tabulation consisting of a plurality of numeral rows for indicating the blank space in line units, each row indicating blank space values which are smaller, by the amount of units contained in a normal word space, than the blank space values in the corresponding place of the preceding row, means for simultaneously indicating the blank space units which would be left if the total number of spaces of the same written line were enlarged a predetermined amount, and means for indicating whether the normal or the enlarged word spaces should be used in the line.

4. A justification indicator for type composing machines or the like, having a blank space slide controlled by the letter spacing element of the composing machine, said slide having a tabulation consisting of a plurality of numeral rows for indicating the blank space in line units, each row indicating blank space values which are smaller, by the amount of units contained in a normal word space than the blank space values in the corresponding place of the preceding row, means controlled by the spacing mechanism of the composing machine for simultaneously indicating the blank space units which would be left if the total number of spaces of the same written line were enlarged a predetermined amount and means for indicating whether the normal or the enlarged word spaces should be used in the line.

5. A justification indicator for type composing machines or the like, having a blank space slide controlled by the letter spacing element of the composing machine, said slide having a tabulation consisting of a plurality of numeral rows for indicating the blank space in line units, each row indicating blank space values which are smaller by the amount of units contained in a normal word space than the blank space values in the corresponding place of the preceding row, means for simultaneously indicating the blank space units which would be left if the total number of spaces of the same written line were enlarged a predetermined amount, and means for indicating whether the normal or the enlarged word spaces should be used in the line, a space indicator slide, controlled by the spacing mechanism of the composing machine, disposed adjacent to said blank space slide, said indicator slide having two rows of space numerals in parallel to the rows of the blank space slide for indicating the number of justifiable spaces, one row having double the number of values of the other row, and means on said indicator slide for showing the desired values of said blank space slide.

6. A justification indicator for type composing machines or the like, having a blank space slide controlled by the letter spacing element of the composing machine, said slide having a tabulation consisting of a plurality of numeral rows for indicating the blank space in line units, each row indicating blank space values which are smaller by the amount of units contained in a normal word space than the blank space values in the corresponding place of the preceding row; means for simultaneously indicating the blank space units which would be left if the total number of spaces of the same written line were enlarged a predetermined amount, and means for indicating whether the normal or the enlarged word spaces should be used in the line, a space indicator slide, controlled by the spacing mechanism of the composing machine, disposed adjacent to said blank space slide, said indicator slide having two rows of space numerals in parallel to the rows of the blank space slide for indicating the number of justifiable spaces, one row having double the number of values of the other row, said indicator slide having a slot permitting the observation of the entire upper unit numeral row of said blank space slide, and having also one window in vertical alinement with each of said space numerals and in horizontal alinement with each of said unit numeral rows, permitting the observation of one value in each of said unit numeral rows of the blank space slide.

7. A justification indicator for type composing machines or the like, having a blank space slide controlled by the letter spacing element of the composing machine, said slide having a tabulation consisting of a plurality of numeral rows for indicating the blank space in line units, each row indicating blank space values which are smaller by the amount of units contained in a normal word space than the blank space values in the corresponding place of the preceding row, means for simultaneously indicating the blank space units which would be left if the total number of spaces of the same written line were enlarged a predetermined amount, and means for indicating whether the normal or the enlarged word spaces should be used in the line, a space indicator slide,

controlled by the spacing mechanism of the composing machine, disposed adjacent to said blank space slide, said indicator slide having two rows of space numerals in parallel to the rows of the blank space slide for indicating the number of justifiable spaces, one row having double the number of values of the other row, said indicator slide having a slot permitting the observation of the entire upper unit numeral row of said blank space slide, and having also one window in vertical alinement with each of said space numerals and in horizontal alinement with each of said unit numeral rows, permitting the observation of one value in each of said unit numeral rows of the blank space slide, and a vertically extending stationary window disposed in front of said slides for observing the values of the slides appearing in a vertical row.

8. A justification indicator for type composing machines or the like, having a blank space slide controlled by the letter spacing element of the composing machine, said slide having a tabulation consisting of a plurality of numeral rows for indicating the blank space in line units, each row indicating blank space values which are smaller by the amount of units contained in a normal word space than the blank space values in the corresponding place of the preceding row, means for simultaneously indicating the blank space units which would be left if the total number of spaces of the same written line were enlarged a predetermined amount, and means for indicating whether the normal or the enlarged word spaces should be used in the line, a space indicator slide, controlled by the spacing mechanism of the composing machine, disposed adjacent to said blank space slide, said indicator slide having two rows of space numerals in parallel to the rows of the blank space slide for indicating the number of justifiable spaces, one row having double the number of values of the other row, and means on said indicator slide for showing the desired values of said blank space slide, the numeral tabulation of one slide being suitably distributed relatively to the tabulation of the other slide to cause, when the 0 indications of both slides are in alinement, underneath each space numeral of the indicator slide the appearance of the blank space value of the other slide which can still be justified by the composing machine at that space number.

9. A justification indicator for type composing machines or the like, having a blank space slide controlled by the letter spacing element of the composing machine, said slide having a tabulation consisting of a plurality of numeral rows for indicating the blank space in line units, each row indicating blank space values which are smaller by the amount of units contained in a normal word space than the blank space values in the corresponding place of the preceding row, means for simultaneously indicating the blank space units which would be left if the total number of spaces of the same written line were enlarged a predetermined amount, and means for indicating whether the normal or the enlarged word spaces should be used in the line, a space indicator slide, controlled by the spacing mechanism of the composing machine, disposed adjacent to said blank space slide, said indicator slide having two rows of space numerals in parallel to the rows of the blank space slide for indicating the number of justifiable spaces, one row having double the number of values of the other row, said indicator slide having a slot permitting the observation of the entire upper unit numeral row of said blank space slide, and having also one window in vertical alinement with each of said space numerals and in horizontal alinement with each of said unit numeral rows, permitting the observation of one value in each of said unit numeral rows of the blank space slide, and a vertically extending stationary window disposed in front of said slides for observing the values of the slides appearing in a vertical row, and a movable shield disposed between said stationary window and said slides, having suitably disposed openings to permit the reading therethrough of such values appearing in said vertical row, which the operator should use for justification.

10. A justification indicator for type composing machines or the like, having a blank space slide controlled by the letter spacing element of the composing machine, said slide having a tabulation consisting of a plurality of numeral rows for indicating the blank space in line units, each row indicating blank space values which are smaller by the amount of units contained in a normal word space than the blank space values in the corresponding place of the preceding row, means for simultaneously indicating the blank space units which would be left if the total number of spaces of the same written line were enlarged a predetermined amount, and means for indicating whether the normal or the enlarged word spaces should be used in the line, a space indicator slide, controlled by the spacing mechanism of the composing machine, disposed adjacent to said blank space slide, said indicator slide having two rows of space numerals in parallel to the rows of the blank space slide for indicating the number of justifiable spaces, one row having double the number of values of the other row, said indicator slide having a slot permitting the observation of the entire upper

unit numeral row of said blank space slide, and having also one window in vertical alinement with each of said space numerals and in horizontal alinement with each of said unit numeral rows, permitting the observation of one value in each of said unit numeral rows of the blank space slide, and a vertically extending stationary window disposed in front of said slides for observing the values of the slides appearing in a vertical row, and a movable shield disposed between said stationary window and said slides, having suitably disposed openings to permit the reading therethrough of such values appearing in said vertical row, which the operator should use for justification, and means controlled by the relative position of said slides for moving said shield to bring such of its windows into alinement with said stationary window, which permit the operator to read the justification for single or enlarged spaces as required.

11. A justification indicator for type composing machines or the like, having a blank space slide controlled by the letter spacing element of the composing machine, said slide having a tabulation consisting of a plurality of numeral rows for indicating the blank space in line units, each row indicating blank space values which are smaller by the amount of units contained in a normal word space than the blank space values in the corresponding place of the preceding row, means for simultaneously indicating the blank space units which would be left if the total number of spaces of the same written line were enlarged a predetermined amount, and means for indicating whether the normal or the enlarged word spaces should be used in the line, a space indicator slide, controlled by the spacing mechanism of the composing machine, disposed adjacent to said blank space slide, said indicator slide having two rows of space numerals in parallel to the rows of the blank space slide for indicating the number of justifiable spaces, one row having double the number of values of the other row, said indicator slide having a slot permitting the observation of the entire upper unit numeral row of said blank space slide, and having also one window in vertical alinement with each of said space numerals and in horizontal alinement with each of said unit numeral rows, permitting the observation of one value in each of said unit numeral rows of the blank space slide, and a vertically extending stationary window disposed in front of said slides for observing the values of the slides appearing in a vertical row, and a movable shield disposed between said stationary window and said slides, having suitably disposed openings to permit the reading therethrough of such values appearing in said vertical row, which the operator should use for justification, and means controlled by the relative position of said slides for moving said shield to bring such of its windows into alinement with said stationary window, which permit the operator to read the justification for single or enlarged spaces as required, and means for producing a signal when enlarged space reading is required.

12. A justification indicator for type composing machines, having a blank space member bearing a tabulation consisting of a plurality of rows of characters, denoting the blank space values, each row being assigned to a different, definite number of word spaces, said tabulation having each character of the actual blank space value, which is not justifiable with the number of spaces to which its row is assigned, substituted by the character for the blank space value which would result if the total amount of the word space were enlarged a predetermined amount.

13. A justification indicator for type composing machines, having a blank space member bearing a tabulation consisting of a plurality of rows of characters, denoting the blank space values, each row being assigned to a different, definite number of word spaces, said tabulation having each character of the actual blank space value, which is not justifiable with the number of spaces to which its row is assigned, substituted by the character for the blank space value which would result if the total amount of the word space were enlarged a predetermined amount, and means controlled by the letter spacing element of the machine for moving said blank space member step by step in the direction of its rows, and character indicating means adjacent to said blank space member and adapted to direct the operator's reading of characters from one of said rows into the adjoining row, said means being controlled by the word spacing element of said machine.

14. A justification indicator for type composing machines, having a blank space member bearing a tabulation consisting of a plurality of rows of characters, denoting the blank space values, each row being assigned to a different, definite number of word spaces, said tabulation having each character of the blank space value, which is not justifiable with the number of spaces to which its row is assigned, substituted by the character for the actual blank space value which would result if the total amount of the word space were enlarged a predetermined amount, the characters for the required word space values being repeated underneath each character of the blank space value in all of said rows.

15. A justification indicator for type composing machines having a blank space mem-

ber bearing a tabulation consisting of a plurality of rows of characters, denoting the blank space values, each row being assigned to a different, definite number of word spaces, said tabulation having each character of the blank space value, which is not justifiable with the number of spaces to which its row is assigned, substituted by the character for the actual blank space value which would result if the total amount of word space were enlarged a predetermined amount, all blank space values for enlarged spaces being located in a field suitably distinguished from the remainder of the tabulation.

16. A justification indicator for type composing machines or the like having a reading drum bearing a tabulation consisting of a plurality of peripheral rows of characters denoting the blank space values, each row being assigned to a different, definite number of word spaces, said tabulation having each character of the blank space value, which is not justifiable with the number of spaces to which its row is assigned, substituted by the character for the actual blank space value which would result if the total amount of the space of the line were enlarged a predetermined amount, means controlled by the letter spacing element of the machine for rotating said drum step by step one blank space character at a time, a shield partly surrounding said drum and having a plurality of windows equal to the number of peripheral rows of said tabulation, one window being in alinement with each row and permitting the reading of the values of each row through them as the drum rotates, means controlled by the word spacing element of the machine, for rotating said shield step by step against the rotation direction of said drum, said windows being peripherally spaced apart from each other the distance of a shield feeding step, and a casing surrounding said shield and said drum, having a window extending axially the length of the drum and permitting the observation of only one of said windows for each of said shield positions.

17. A justification indicator for type composing machines and the like, having a blank space member bearing a tabulation consisting of a plurality of rows of characters denoting blank space values, means controlled by the letter spacing element of the machine for moving said blank space member step by step in the direction of said rows, one character at a time, each row being assigned to a different, definite number of normal word spaces over which the blank spaces of that row may be distributed, movable indicating means controlled by the word spacing element of the machine, bearing characters denoting said different numbers of word spaces and also bearing characters denoting the number of word spaces when all the spaces of the line are enlarged a predetermined amount, said blank space member and said indicating means being suitably coördinated to indicate to the operator the blank space to be justified and the number of normal or enlarged word spaces over which the justification is to be distributed.

EDUARD MAREK v. MARCHTHAL.

Witnesses:
AUGUST FUGGER,
ADA MARIA BERGER.