Sept. 17, 1940. S. M. FOMENKO 2,215,119

AUTOMATIC LINE JUSTIFICATION MEANS

Filed July 27, 1936 3 Sheets-Sheet 1

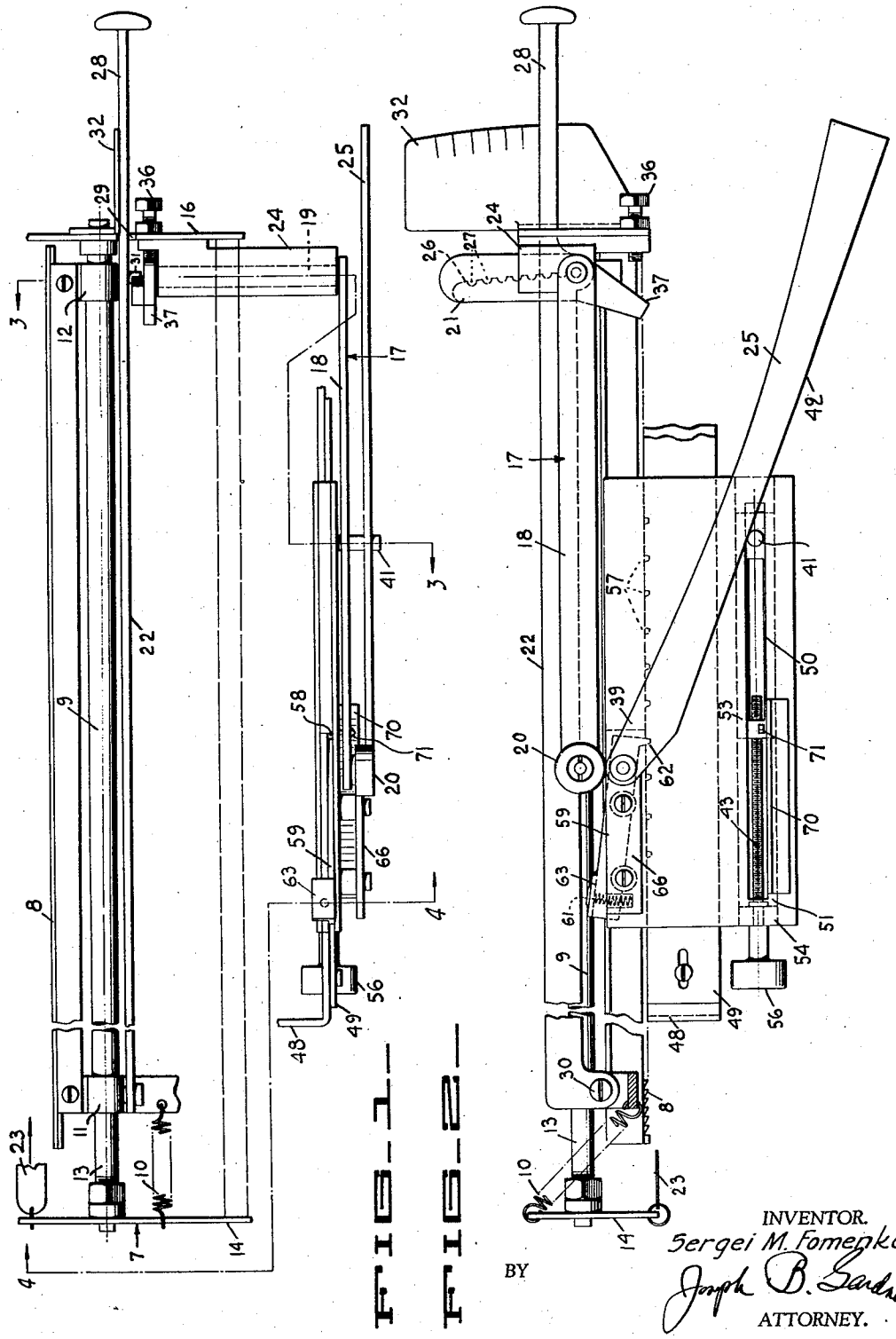

FIG. 1.

FIG. 2.

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AUTOMATIC LINE JUSTIFICATION MEANS

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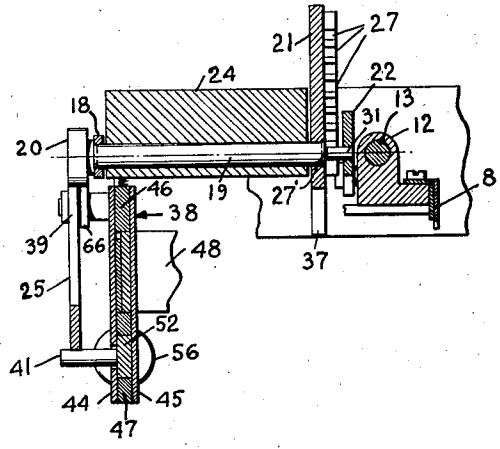

FIG. 3.

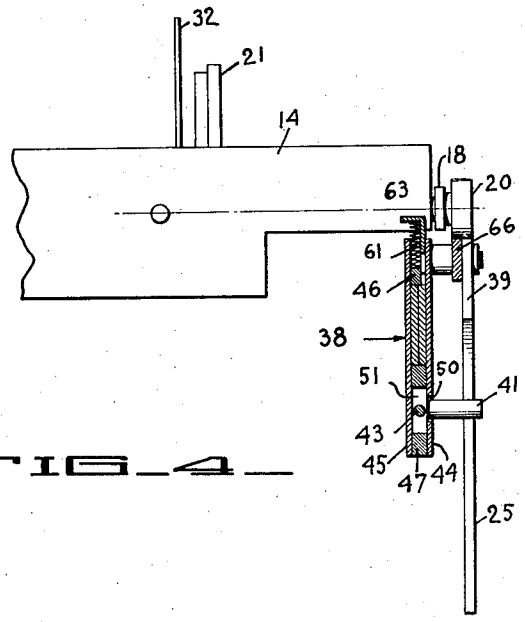

FIG. 4.

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AUTOMATIC LINE JUSTIFICATION MEANS

Filed July 27, 1936 3 Sheets-Sheet 3

It does not appear reasonable to fix rigidly any of our terms at the present time. Even the most carefully studied concept in the field, Spearman's "g," does not seem to be sufficiently clearly distinguished from other factors to be considered a fixed point of reference.

With regard to the development of factor analysis techniques, we may distinguish three groups who have each contributed in different ways to the solution of the problems involved. The first group is composed of men such as Spearman and, more recently, Kelley, who may be regarded as the "pathbreakers." These men have pointed the way, set up the theories, and stimulated interest in the problems. A second group is composed of men such as Thomson and Tryon, who might be termed "opponents" or, perhaps better, critics of the theories developed by these pioneers. Their contributions have taken the form of a more rigorous statement of the issues and have also stimulated those being criticized to attempt more thorough experimental investigation. The third group which has made substantial contributions to factor analysis methods is comprised of men in the fields of applied mathematics, such as Wilson, Garnett, Hotelling, Piaggio, and Irwin. By providing solutions for many of the mathematical problems involved and pointing out limitations in interpretations imposed by certain mathematical considerations, these men have aided materially in the development of techniques.

The technique developed by Hotelling for analyzing a complex of variables into independent principal components such that the first contains as large an amount of the total variance as possible, the second as large an amount of the remaining variance as possible, etc., seems to be the most applicable to the solution of the problem of obtaining new independent measures. It should be noted, however, that the technique has serious limitations. It does give new independent general factors, a small number of which are usually found to account for a very large percentage of the variance; but these factors do not necessarily coincide with psychological or physiological unities. If, for instance, reaction time, number of neurones, and basal metabolism were the chief determiners of performance on a series of four tests,

FIG. 5

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FIG. 5

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Patented Sept. 17, 1940 2,215,119

UNITED STATES PATENT OFFICE

2,215,119

AUTOMATIC LINE JUSTIFICATION MEANS

Sergei M. Fomenko, Palo Alto, Calif.

Application July 27, 1936, Serial No. 92,719

16 Claims. (Cl. 197—84)

The invention relates to typewriters, printing machines and the like, and to the carriage moving and spacing mechanism on these devices. More particularly the present invention relates to a mechanism as disclosed in my pending application, Serial Number 73,272 filed April 8, 1936, of which application this application forms a continuation-in-part.

An object of the invention is to provide in a device of the character described an automatic line justification means which will effect a slight and unnoticeable variation in the size of the letter spacing over a substantial portion of the line whereby the decrease of spacings for causing a vertical alignment of the right-hand end of the line will be distributed over said line or a substantial portion thereof not only between the words, as has been heretofore provided, but also in the words themselves whereby, notwithstanding the vertical alignment of the ends of the line and a variation in the letter spaces in the lines, no line will appear either crowded or expanded and no excessive spaces will appear between the words of the line as is common in ordinary justified printed matter.

Another object of the invention is to provide an automatic line justification means of the character described which will provide for the automatic justification of type or printed matter throughout a wide range of column widths and for causing a uniform spacing of the letters in each line regardless of the column width.

A further object of the invention is to provide an automatic line justification means which is adapted to justify several columns on a single page or a column located at substantially any part of the typed or printed page.

Still another object of the invention is to provide an automatic line justification means of the character above in which the several parts thereof will be specially designed to provide a maximum simplicity and positiveness of operation and be further adapted for use with present types of construction of typewriters and printing machines.

The invention possesses other objects and features of advantage, some of which, with the foregoing, will be set forth in the following description of the preferred form of the invention which is illustrated in the drawings accompanying and forming part of the specification. It is to be understood, however, that variations in the showing made by the said drawings and description may be adopted within the scope of the invention as set forth in the claims.

Referring to said drawings:

Figure 1 is a plan view of a line justification means constructed in accordance with the present invention.

Figure 2 is a rear elevation of the apparatus illustrated in Figure 1.

Figure 3 is a sectional view of the apparatus taken substantially on the plane of line 3—3 of Figure 1.

Figure 4 is a transverse view shown partly in section and taken substantially on the plane of line 4—4 of Figure 1.

Figure 5 is a printed reproduction of a typed column as produced by a standard typewriter.

Figure 6 is a printed reproduction of the same column produced by the apparatus of the present invention.

The apparatus of the present invention, and as illustrated in the drawings, is arranged for use in combination with a standard typewriter or printing machine or any recording machine of this character having a base support or frame, a movable carriage and some means, such as an escapement mechanism operated through an assembly of type and keys, for releasing the carriage for movement in steps relative to the frame or support for spacing the letters and words of each recorded line. This type of mechanism is well known in the art and only parts thereof are here shown so as to simplify the disclosure and better illustrate the operation of the line justification means of the present invention. For the purpose of the present disclosure there is illustrated part only of a carriage 7 and a carriage rack 8, the usual escapement mechanism for releasing such rack for movement and a frame support of the mechanism as well as the keys and type and operating connections between the escapement and keys having been omitted in view of clarity and simplicity.

As will be understood, in the usual typewriter or printing machine of this character the escapement mechanism operates through a pinion to release the rack and carriage for movement by a tape 23 drawn by a spring mechanism, not shown, so that the displacement of the carriage is exactly equal to the movement of the escapement mechanism. Thus for any given length of recorded line the number of letter spaces is always constant, and since usually the number of letter spaces must vary with each line, the lengths of the recorded lines are not uniform and an irregular right-hand margin results. With such a machine a justification of the lines may be effected only by a tedious and slow adjustment of

the spaces between the words, which is not always satisfactory for the reason that the irregular spacing which is thereby required between the words is immediately apparent on viewing the recorded work. In accordance with the present invention, however, and as previously stated as an important object thereof, the size of the letter spaces for each line may be minutely adjusted so as to change the number of spaces in the line by one space so that a plurality of lines may be recorded, each differing from the other by a progression of one letter space. Furthermore, this increase in the size of the letter space is distributed over the line, or a substantial portion thereof, so that the change of space between the letters and the words of the different lines will be entirely unnoticeable and the recorded work, as a whole, will have the appearance of perfect uniformity notwithstanding the vertical alignment of the ends of the line and the variant number of spaces in the lines themselves.

This change in the size and number of letter spaces for a given length of line is effected by the interpositioning between the carriage rack and the carriage proper of a mechanism which will modify the movement permitted by the escapement mechanism to the carriage and which is displaceable to regulate the size of the steps of movement at the carriage. As will be seen from Figure 1 of the drawings, the rack 8 is mounted for movement relative to the carriage 7 by means of a sleeve 9 connected by brackets 11 and 12 to the ends of the rack 8 and which sleeve is reciprocally carried on a shaft 13 extending longitudinally between the end plates 14 and 16 of the carriage. Preferably, due to the offset connection between the rack and shaft, a spring 10 is connected between the bracket 11 and carriage plate 14 for holding the rack in engagement with the escapement pinion (not shown). Means for transmitting the movement of the rack to the carriage proper consists of a crank 17 including an arm 18 journalled by means of a shaft 19 to the carriage and including a lever member 21 which is in turn connected by a link 22 to the rack 8, the other end of the arm 18 being provided with a roller 20 which engages with an incline member 25 carried by the frame or support of the typewriter or printing machine. Thus as the carriage and rack are released by the escapement mechanism and drawn widthwise of the arm by means of the tape 23, the arm 18 will be rotated by reason of the movement of the roller 20 over the incline member 25 and a relative displacement between the rack 8 and carriage 7 thereby effected according to the relative eccentric positioning of the link 22 and the member 21 to allow the carriage to move slightly further than the rack.

Viewed with greater detail it will be seen that the shaft 19 of the crank 17 is journalled in a bearing block 24 secured to the end wall 16 of the carriage, and the arm 18 of the crank extends for a considerable distance from the shaft 19 so that its rotational displacement may be minutely gauged, and also to minimize the vertical reacting force on the arm 18 tending to lift the carriage from the frame of the typewriter. As will be further seen from Figure 3, the lever member 21 is positioned on the shaft 19 at the forward end of the bearing block 24 and is provided with a lateral face 26 which passes through the axis of the shaft 19. Formed in the face 26 are a plurality of notches 27 which are positioned on the face at uniform distances from the axis of the shaft 19 to the outer end of the face. The link 22 is pivoted to the bracket 11 adjacent the end 14 of the carriage and extends in a generally parallel relation to the sleeve 9 to dispose the opposite end 28 well beyond the end wall 16 of the carriage and is extended through such end wall by means of a vertical slot 29 in the wall. As here shown, the link 22 is provided with a pin 31 for engagement in one of the several notches 27 in the face 26 of the eccentric member. To facilitate the selective engagement of the pin with the notches, the outer end 28 of the link is preferably formed as a handle for enabling the ready vertical manipulation of the link member. Also it will be noted that the spring 10 will function to resiliently retain the pin 31 in the desired notch of member 21, this being particularly desired during the return movement of the carriage 7, since at such period the tension provided by the tape 23 is released. Preferably a graduated plate 32 is secured to the end wall 16 of the carriage and opposite the handle 28 for indicating the notch engaged by the pin 31.

In the present arrangement of the lever 21, the lowermost notch 27' is positioned on the face 26 directly opposite the axis of the shaft 19 whereby with the pin 31 engaged in such notch there will be no relative movement between the carriage and the rack regardless of the angular position of the arm 18. As will be understood, the movement of the pin 31 to the successive outer notches 27 on the face 26 will successively increase the amount of relative displacement between the carriage and the rack for a given length of movement of the carriage assembly relative to the frame. In order that the positioning of the pin 31 in the successive outer notches will produce a substantially constant increment of displacement between the carriage and rack, three relatively important physical characteristics of the mechanism must be observed. First, the notches themselves should be equally and uniformly spaced on the face 26. Secondly the base of the notches should be positioned on a curved line having as the center of curvature thereof the pivotal connection 30 of the link 22 and bracket 11, so that in shifting the link from one notch to another at the beginning of a recorded line there will be no initial displacement of the rack and carriage. Thirdly the incline member 25 should be curved over its length so as to produce a uniform rotation of the arm 18 over the full length of the engagement of the roller 20 with the member 25 so as to compensate for the longitudinal and angular displacement of the arm 18 relative to the incline member as the carriage moves relative to the frame. In the accompanying drawings, the curve of the incline member presented to the roller 20 has been calculated to give a substantially uniform rotation of the arm 18 for an average column length of fifty letter spaces as gauged on the standard typewriter. I have found that by the use of such a curve, the error present in column widths ranging from 25 to 75 letter spaces is entirely negligible. In order to produce a perfectly vertical right-hand margin, it is further necessary that the modifying means be taken out of operation at a point where, for any given incline of the member 25 the notch 27 adjacent the first notch 27' will produce exactly one less letter space in the line than with the pin positioned in the notch 27', and with the pin positioned in the second outer notch exactly two letter spaces less, and

so on. In other words, for a given distance of separation of the notches 27 there will be an exact elevation on the incline member 25 regardless of the latter's angularity wherein the above relationship shall exist, or, stated in another way, there is one rotative position of the lever member 21 wherein the horizontal components of movement of the several notches will vary from each other by exactly one letter space. To take the modifying means out of operation at this angular position of the lever member 21, a set-screw 36 is positioned on the end wall 16 of the carriage and may be adjusted to engage the lower end 37 of the lever member 21 to stop this member in its critical rotative position.

As an important feature of the present invention, I may vary over a relatively wide range the width of the recorded column within which the various positions of the pin 31 in the notches 27 will produce a complete letter space differential in the recorded line. This is effected by changing the pitch or angularity of the incline member 25 so that the aforementioned rotational displacement of the arm 18 to produce an exact vertical alignment of the right-hand margin of the column may be effected for various widthwise movements of the carriage relative to the frame. The means of adjusting the pitch of the incline member may be seen from Figures 2, 3 and 4 and as there illustrated comprises a frame supported structure 38 to which an end 39 of the incline member 25 is pivoted. Mounted transversely from the structure 38 below and to one side of the pivotal connection of the incline member is a tranverse pin 41 which supports the underside 42 of the incline member and is adjustable by means of a screw 43 to change the pitch or incline of the member 25. More specifically the supporting structure 38 comprises a pair of flat plates 44 and 45 which are connected at their upper and lower ends with spacer bars 46 and 47 and are supported by the bar 46 on a frame supported bracket 48, the latter being secured to the frame of the typewriter (not shown) and having an outer side 49 in the form of a flat strap or band which is enclosed between the plates 44 and 45 and the spacer bars 46 and 47. The central portion of the lower spacer bar 47 is formed with a longitudinal open portion 51 in which is reciprocally mounted a slide member 52 which carries the pin 41, and the latter is extended from a slot 50 in the plate 44 while the slide is threadably connected at an end 53 with the screw 43, the latter being journalled against longitudinal movement in an end 54 of the spacer member 47 and preferably provided with a knob 56 at its outer end for effecting rotation of the screw and longitudinal adjustment of the pin 41. In practice the screw 43 is set by moving the carriage to the extreme right margin of the page to be recorded and then the screw 43 is adjusted so as to bring the arm 18 to its final rotated position, that is with the lower end 37 of the arm engaged with the end of the screw 36. This operation may be facilitated by the mounting of a graduated scale 70 on the plate 44 and an indicator member 71 on the slide 52. Thus by appropriate adjustment of the screw 43, and of the pitch of the incline member 25, substantially any width of column may be recorded with the right-hand margin thereof perfectly justified.

As a further important feature of the present invention, I may adjust the widthwise position of the incline member 25 relative to the frame whereby a justified recorded column may be variously positioned over a wide range on the recorded sheet of paper. In this manner not only may the justified column be shifted to any widthwise position on the recorded sheet, but a plurality of columns of different widths and positioning may be recorded on the same sheet by the same apparatus. This feature is made possible by a provision for shifting the frame supported structure 38 to which the incline member is attached widthwise of the frame. As will be noted particularly from Figures 2 and 3, there is positioned on the front of the bracket strap 49, and within the enclosure defined by the plates 44 and 45 and the spacer bars 46 and 47, a plate 49, on the upper edge of which are provided a plurality of longitudinally spaced notches 57. Pivotally mounted in a cut-away portion 58 at the end of the upper spacer bar 46, is a key 59 which is normally rocked by a spring 61 to engage a pawl 62 at the opposite end of the key in one of the notches 57 to thereby hold the supporting structure 38 against widthwise movement on the frame members 48 and 49. However, on depression of the end 63 of the key opposite the pawl 62 to withdraw the pawl from one of the notches, the assembly 38, together with the incline member 25, may be freely adjusted widthwise of the frame and held fixed in adjusted positions by re-engaging the pawl 62 with an appropriate notch 57. Desirably these notches are spaced by a uniform distance, say of one-half inch, whereby the left-hand margin of the column may be adjusted on the recorded page as desired. In operation the carriage is set at the left-hand margin of the column to be recorded and the operator then adjusts the supporting structure 38 widthwise of the frame to position the pivotal connection of the upper end 39 of the incline member directly under the roller 20. Preferably a horizontal plate 66 is mounted adjacent the incline member 25 for supporting the roller 20 when the latter is to the left of the incline member 25 and during the widthwise adjustment of this member.

In operating the present apparatus, the subject matter to be recorded is preferably first typed on a standard typewriter or the like, or on the present apparatus with the pin 31 positioned in the lowermost notch 27' to prevent any modification of the size of the letter space. Such a standard recorded column is illustrated in Figure 5 of the drawings. The irregularity of the right-hand margin may be simply analyzed by drawing one or more vertical lines through the ends of each recorded line. With this done, it will be seen in the case of the column here illustrated that the longest recorded line is seven letter spaces greater than the shortest recorded line. In re-typing this column to produce a perfect vertical alignment of the right-hand margin, the carriage is first set at the left-hand margin and the supporting mechanism 38 at the rear of the typewriter is shifted to position the pivoted end of the incline member under and aligned with the roller 20. The carriage is then moved to the right-hand margin corresponding to the longest line in the column to be recorded, in this case 57 letter spaces. With the carriage at this position the screw 43 is adjusted to move the arm 18 into a rotative position where the lower end 37 of the eccentric member is engaged by

the set screw 36. The operator is then ready to start. Before starting to type the first line the operator notes that such line is three spaces short of the longest line in the recorded column, and accordingly he moves the handle 28 to engage the pin 31 with the third notch from the pivotal connection of the lever member 21 and then proceeds to type the line in the usual fashion. Since the second line is equally short the handle 28 is left in the same position for the typing of the second line, but prior to the typing of the third line the operator, noting that this line is seven spaces short, moves the handle to the seventh notch 27 from the pivotal connection of the eccentric member 21. The following lines are then typed with a proper initial setting of the handle 28. The result of the above recording made in the manner described with the present apparatus is illustrated in Figure 6, wherein it will be noted that each short line in the original recording has been lengthened to exactly the same length as the longest line and a perfect vertical alignment of the right-hand margin of the recorded subject matter results. Figures 5 and 6 have been printed from plates made by a photoprinting process and are exact reproductions of the two sets of typing, only reduced thirty per cent from the original typing.

I claim:

1. In a line justifying means for a typewriter or the like having a support, a carriage movable on said support, means for moving said carriage in steps to space the letters of a recorded line, an incline member secured to said support, an arm pivoted to said carriage and engageable with said incline member to rotate said arm on movement of said carriage relative to said support, and means carried by said carriage and actuated by the rotation of said arm to modify the size of said steps, said incline member being curved to provide substantially uniform rotation of said arm for each length of displacement of said arm over said incline member.

2. In a line justifying means for a typewriter or the like having a support, a carriage movable on said support, means for moving said carriage in steps to space the letters of a recorded line, an incline member secured to said support, an arm pivoted to said carriage and engageable with said incline member to rotate said arm on movement of said carriage relative to said support, and means carried by said carriage and actuated by the rotation of said arm to modify the size of said steps, and stop means independent of said incline member positioned to engage said arm after a predetermined arcuate movement thereof corresponding to an actuation of said last named means to justify a recorded line.

3. A line justifying means for a typewriter or the like having a frame, an escapement mechanism, a carriage movably mounted on said frame, a rack mounted on and movable relative to said carriage and connected to said escapement mechanism, a mechanism interposed between said rack and carriage for modifying the movement from said escapement mechanism to said carriage comprising, an incline member mounted on said frame, a crank mounted on said carriage, an arm rotated by said crank on movement thereof over said incline member upon displacement of said carriage relative to said frame, a link pivoted to said rack and engageable with a face of said arm at selective distances from the latter's axis of rotation, said arm face being curved with the point of pivotal connection of said link with said rack as the center of curvature.

4. A line justifying means as characterized in claim 3 wherein said arm face is provided with a plurality of notches positioned in successively spaced relation from the axis of rotation of said arm, a pin on said link engageable with said notches, a handle portion at the end of said link extending beyond said arm, and a graduated plate positioned adjacent said handle portion for indicating the relative engagement of said pin and notches.

5. A line justifying means for a typewriter or the like having a frame, an escapement mechanism, a carriage mounted on and movable widthwise of said frame, spring means for drawing said carriage to one side of said frame, a rack movably mounted on said carriage and released for movement in steps by said escapement mechanism, a guide mounted on and extending widthwise of said frame, a slide on said guide, means for holding the slide in adjusted position on said guide, an arm pivoted to said slide, means for adjusting the angularity of said arm relative to said frame, a crank member rotatably mounted on said carriage and engageable with said arm to rotate said crank on movement of said carriage relative to said frame, a lever rotated by said crank, and a link pivoted to said rack and engageable with said lever at selective distances from the latter's axis of rotation for controlling the relative movement of said rack and said carriage.

6. A line justifying means for a typewriter or the like having a support, a carriage movable on said support, a part movably carried by said carriage, means for moving said part in steps to space the letters of a recorded line, a mechanism for differentiating between the movement of said part and the carriage to modify the size of said steps at the carriage and comprising, cam and follower means mounted on said support and carriage, a lever carried by said carriage and rotated by said last named means on relative movement of said carriage and support, and means connected to said movable carriage part and engageable with said lever at selective distances from the latter's axis of rotation.

7. A line justifying means for a typewriter or the like having a support, a carriage movably mounted on said support, resilient means for moving said carriage in relation to said support, a movable member carried by said carriage, means connecting said support and movable member for releasing said member for movement in steps to space the letters of a recorded line, an incline member mounted on said support, a member rotatably carried by said carriage and engageable with said incline member, a lever carried by said carriage and rotated by said member upon relative displacement of said carriage and support, and a member connected to said movable carriage member and engageable with said lever at selective distances from the latter's axis of rotation.

8. In a line justifying means for a typewriter or the like having a support, a carriage movable on said support and having a relatively movable part, means for moving said part in

steps to space the letters of a recorded line, connection means between said carriage and part comprising a lever and means connectible to said lever at a plurality of distances from the center of rotation thereof for differentiating between the movement of said carriage and part by a plurality of whole steps for a predetermined rotation of said lever, means for rotating said lever upon movement of said carriage relative to said support and being adjustable for causing the aforesaid predetermined rotation of said lever for different lengths of movement of said carriage.

9. In a line justifying means for a typewriter or the like having a support, a carriage mounted for movement on said support, means for moving said carriage in steps to space the letters of a recorded line, an incline member secured to said support, a movable member on said carriage engageable with and movable by said incline member, means mounted on said carriage and actuated by the movement of said movable member relative to said incline member to modify the size of said steps, means for moving said incline member in the direction of movement of said carriage relative to said support for controlling the position of the space on a recorded page over which the modification in size of said steps is effected, and movable abutment means for said incline member carried by and moveable with said last named means for adjusting the pitch of said incline member.

10. In a line justifying means for a typewriter or the like having a frame, a carriage movable on said frame, means for moving said carriage in steps to space the letters of a recorded line, a slide bar provided on said frame, a bracket slidably mounted on said slide bar, a holding mechanism carried by said bracket and engageable with said bar for adjustably positioning said bracket on said bar, an inclined member pivotally mounted on said bracket, a threaded screw means carried by said bracket and abutting said incline member for adjusting the slope thereof, indicia means provided on said bracket for indicating the pitch of said incline member, a movable member on said carriage engageable with said incline member, and means mounted on said carriage and actuated by the relative movement of said movable member on said incline member to modify the size of said steps.

11. In a line justifying means for a typewriter or the like having a support, a carriage movable on said support and having a relatively movable part, means for moving said part in steps to space the letters of a recorded line, connection means between said carriage and part comprising a lever member and means connectible thereto at a plurality of distances from the center of rotation thereof for differentiating between the movement of said carriage and part by a plurality of whole steps for a predetermined rotation of said lever member, and means for rotating said lever member through said predetermined rotation upon a predetermined movement of said carriage on said support.

12. In a line justifying means for a typewriter or the like having a support, a carriage movable on said support and having a relatively movable part, means for moving said part in steps to space the letters of a recorded line, connection means between said carriage and part comprising, a member pivoted at one end to said part, a lever mounted on said carriage and provided with a plurality of connection portions for the opposite end of said member, said portions being equally spaced from the pivotal axis of said first end of said member and at a plurality of distances from the center of rotation of said lever for causing a differentiation between the movement of said carriage and part by a plurality of whole steps for a predetermined rotation of said lever, and means for rotating said lever through said predetermined rotation upon a predetermined movement of said carriage on said support.

13. In a line justifying means for a typewriter or the like comprising a support, a carriage movable on said support, means for moving said carriage in steps relative to said support to space the letters of a recorded line, a cam mounted on said support, a follower mounted on said carriage and engageable with said cam to effect on increment of movement of said follower upon movement of said carriage relative to said support in one of said steps, and means actuated by said follower to modify the size of said steps and comprising an adjustable leverage system connected between said follower and carriage providing a plurality of step sizes for each increment of movement of said follower.

14. A typewriter comprising a support, a carriage movable on said support, mechanism for moving said carriage in steps to space the letters of a recorded line, an incline member secured to said support, a movable member on said carriage engageable with and movable by said incline member, mechanism mounted on said carriage and operative by the movement of said movvable member relative to said incline member to modify the size of said steps, movable supporting means on said support for said incline member for moving the latter in the direction of said movement of said carriage relative to said support for controlling the position of the space on a recorded page over which the modification of the size of said steps is effected, and movable abutment means for said incline member supported by and movable with said first means for adjusting the pitch of said incline member.

15. In a line justifying means for a typewriter, or the like, having a support, a carriage movable on said support, means for moving said carriage in steps to space the letters of a recorded line, an incline member secured to said support, a member movably supported on said carriage and engaged with said incline member to cause a displacement of said second member relative to said carriage upon movement of said carriage relative to said support, and means carried by said carriage and connected to said second member and actuated by said displacement to modify the size of said steps, said last named means being adjustable to vary the size of said steps for a fixed incline of said incline member.

16. In a line justifying means for a typewriter or the like having a support, a carriage movable on said support, means for moving said carriage in steps to space the letters of a recorded line, an incline member secured to said support, a member movably supported on said carriage and engageable with said incline member to cause a displacement of said second member relative to said carriage upon movement of said carriage relative to said support, means on said carriage connected to said second member and actuated

by said displacement to modify the size of said steps, said means including as part thereof a lever the effective length of which is adjustable to provide a plurality of step sizes for a single pitch of said incline member to uniformly space different numbers of letters in a given length of recorded line, and means for adjusting the pitch of said incline member for controlling the length of line over which the modification in size of said steps is effected.

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