

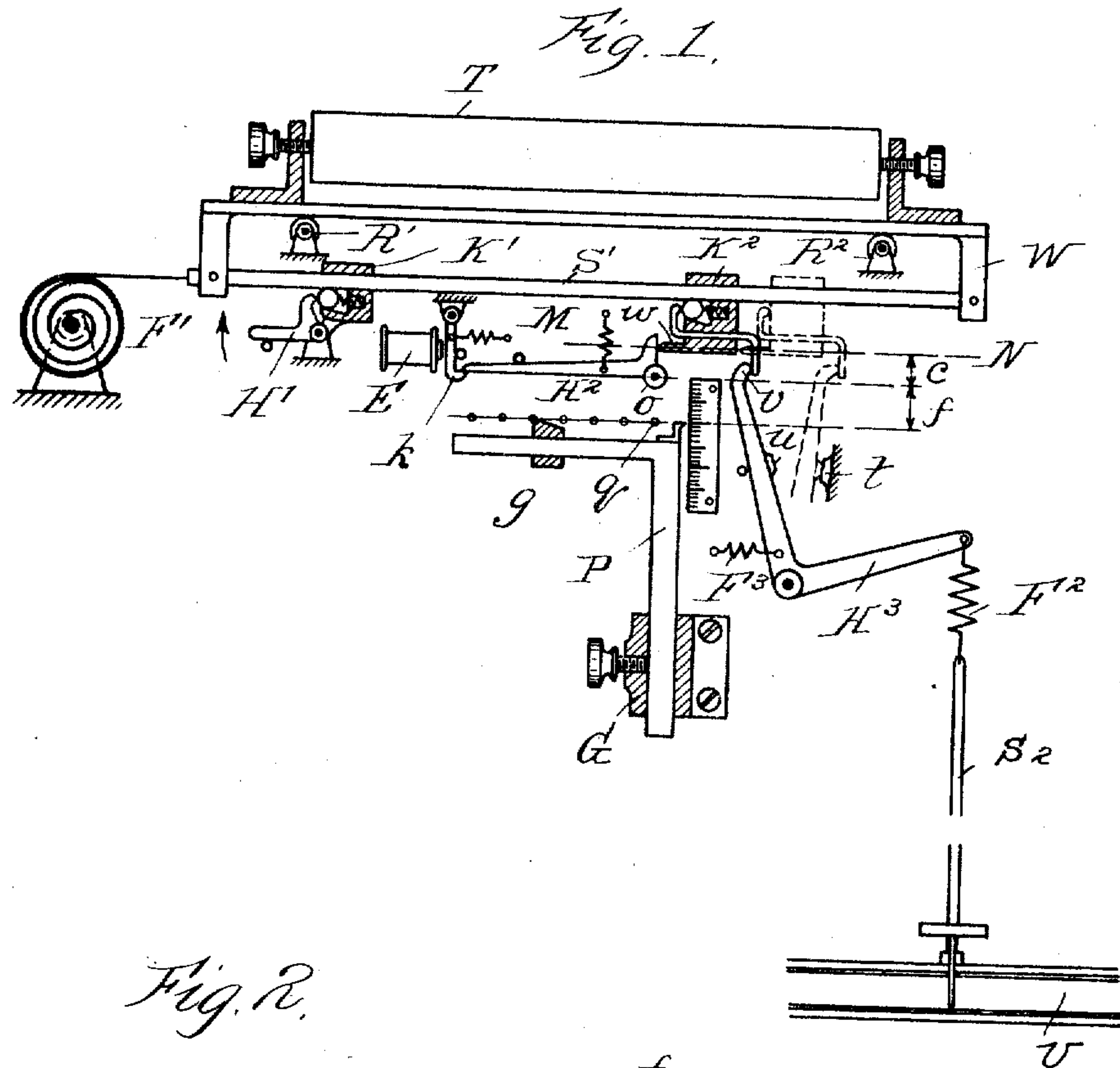
No. 844,378.

PATENTED FEB. 19, 1907.

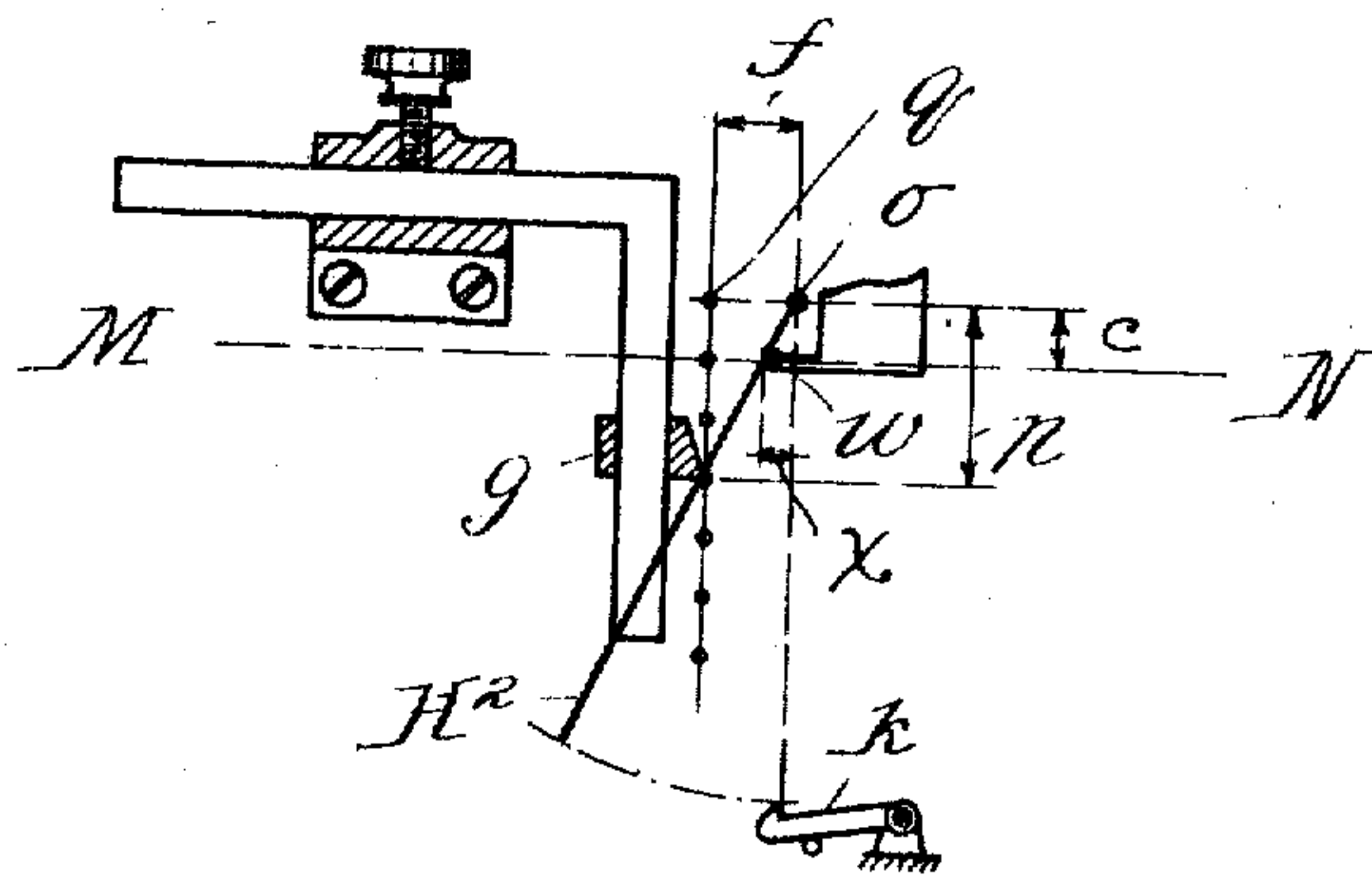
E. M. v. MARCHTHAL.  
DEVICE FOR THE JUSTIFICATION OF THE LENGTHS OF LINES  
OF TYPE WRITING OR SIMILAR MACHINES.

APPLICATION FILED SEPT. 18, 1906.

2 SHEETS—SHEET 1.



*Fig. 2.*



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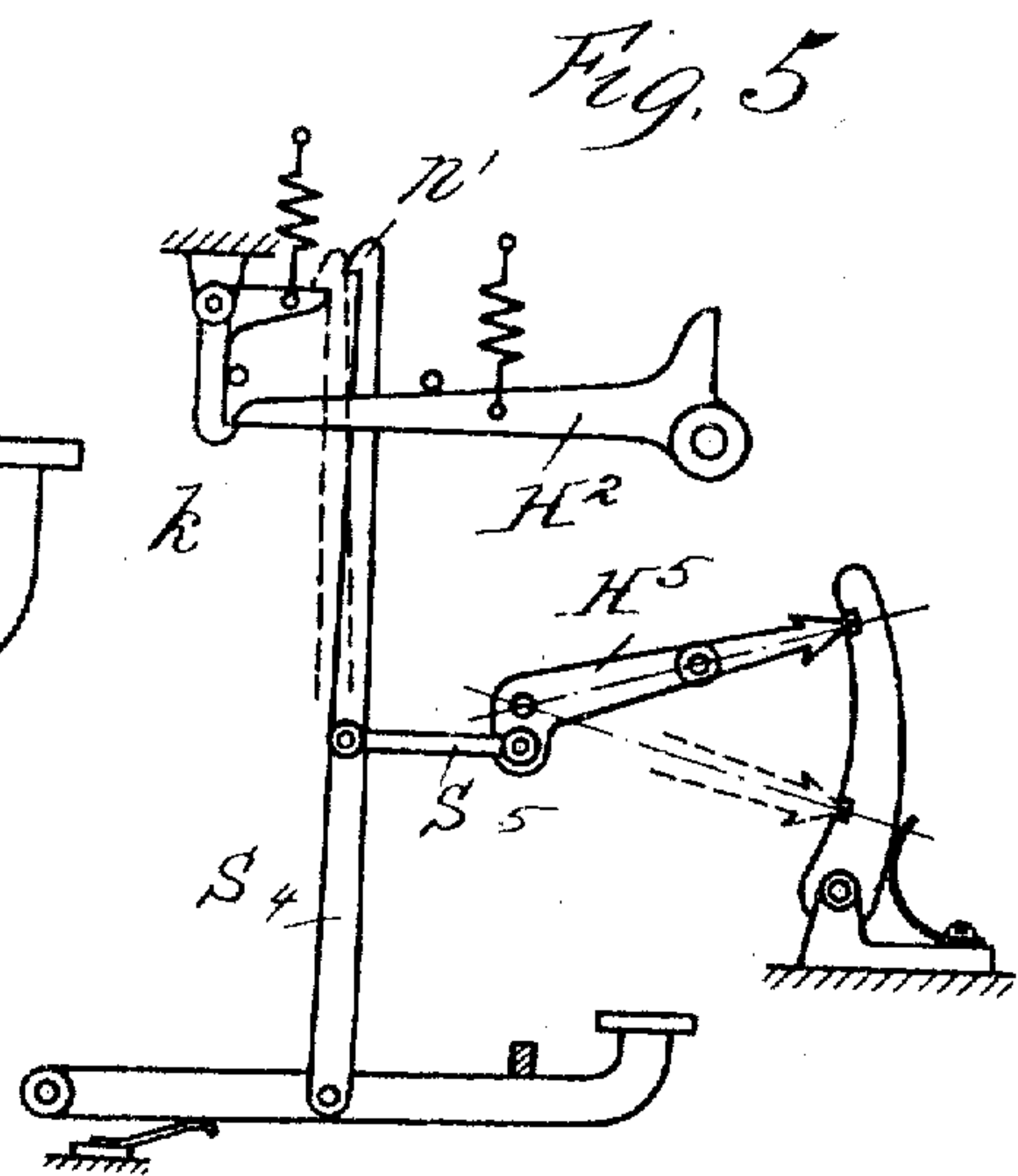
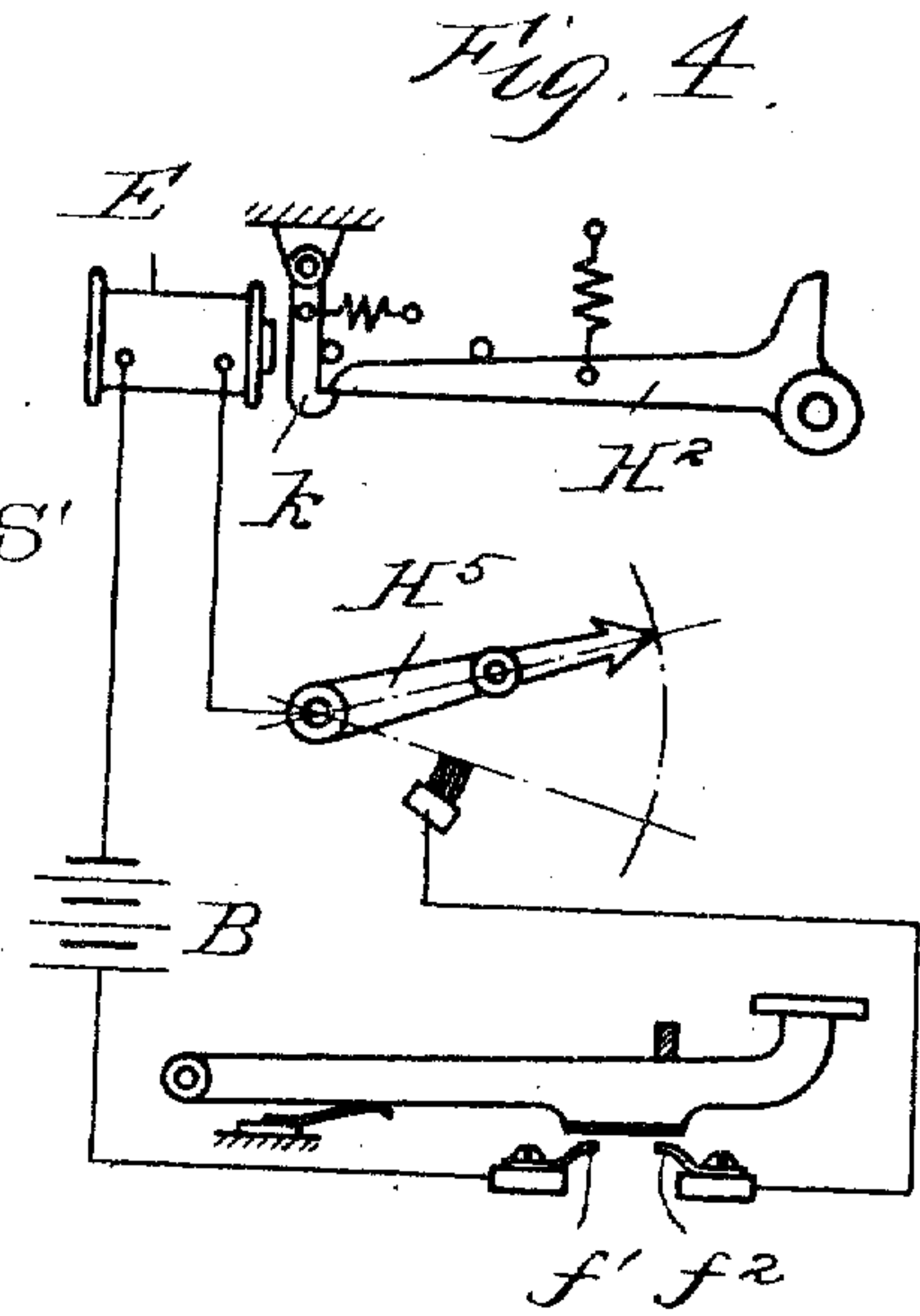
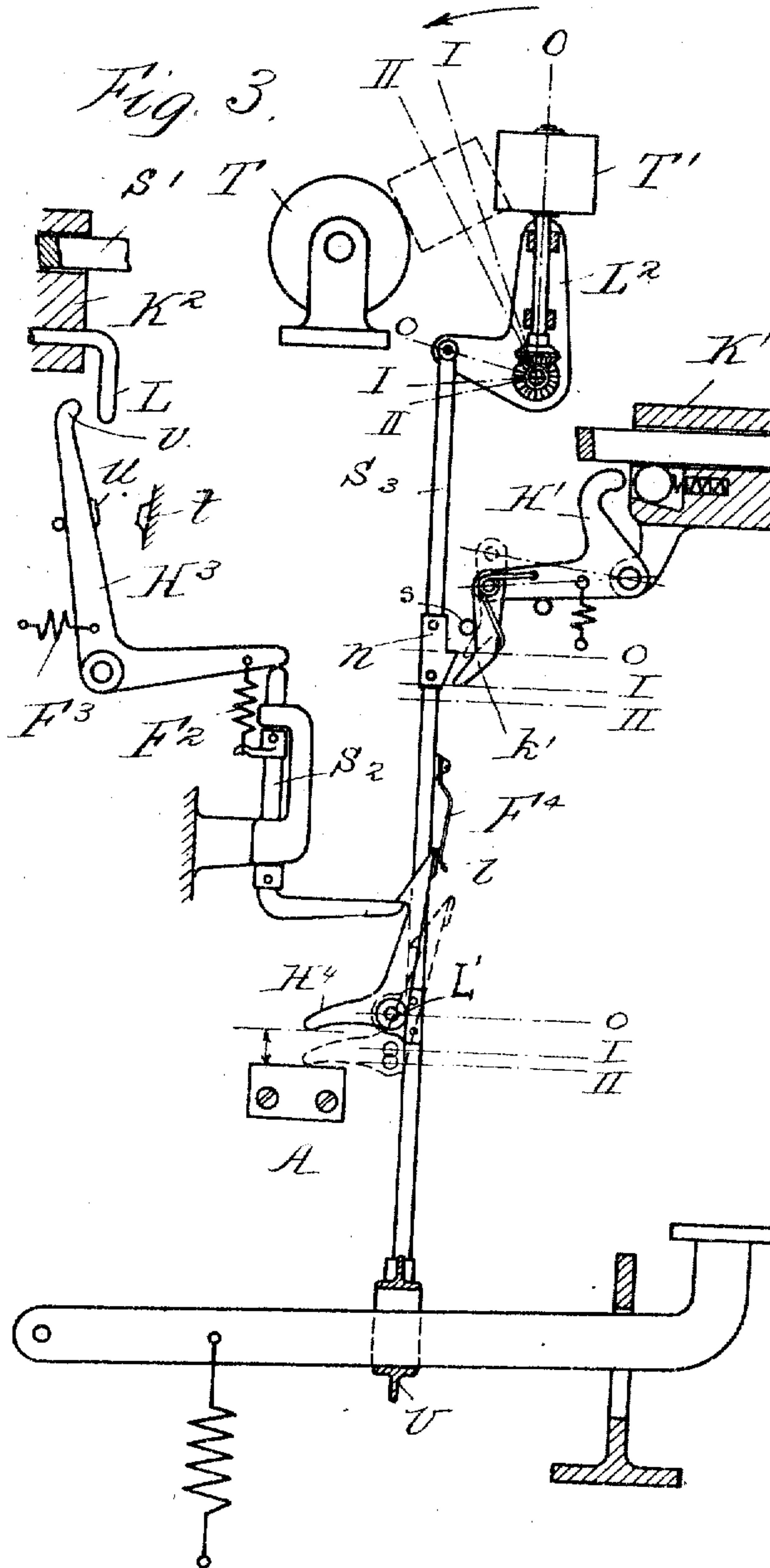
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2 SHEETS—SHEET 2.



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# UNITED STATES PATENT OFFICE.

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DEVICE FOR THE JUSTIFICATION OF THE LENGTHS OF LINES OF TYPE-WRITING OR SIMILAR MACHINES.

No. 844,378.

Specification of Letters Patent.

Patented Feb. 19, 1907.

Application filed September 18, 1906. Serial No. 336,068.

*To all whom it may concern:*

Be it known that I, EDUARD MAREK V. MARCHTHAL, a subject of the Emperor of Germany, and a resident of Charlottenburg, Berlin, Germany, have invented a new and useful Improvement in Devices for the Justification of the Length of Lines of Type-Writing or Similar Machines, of which the following is a specification.

The present invention relates to type-writing, composing, type-casting, and embossing machines and the like, and has for its object a device for the justification of the lines of said machines which work in such a way that the separate lines are made in the first place, by way of trial, without regard to the justification or equalization of the lines. The resulting shortage of the length of the lines is then distributed among the elements of the text forming the lines—namely, either among all the elements of the text or only among some of them—for example, the spaces between the words, and, lastly, according to the suitable setting of the mechanical devices on which the width of the elements of the text depends, the final production of the lines takes place, resulting in lines of the standard length which is intended. In this manner after the first production of each single line the “amounts of justification”—namely, the amount of the shortage and the number of the elements of the text among which the same is to be distributed—may be determined and noted, which may take place either by reading and writing down or by means of automatic mechanical perforating devices. It is unimportant for the present invention whether the final production of the lines is effected by hand or by perforated strips which are produced during the first formation of the text.

The device forming the object of the present invention may be used with various kinds of type-writing machines, and also it is immaterial whether the normal lateral feed of the paper is equal for all the keys, in which case the separate characters and spaces between the words will all occupy the same room on the paper, or whether the feed of the paper varies in amount with the separate keys.

The typing of the text a second time, which is necessary, because the type-writing when

once written cannot alter its place again on paper, makes the use of the device appear troublesome; but as the second impression can be effected automatically and can then be also repeated at the same time as frequently as possible the use of the device, particularly suitable for the production of large numbers of copies of a text, as for circulars, business prospectuses, and the like, where an improved appearance of the type-written or printed matter is of advantage.

An important object of the present invention is to effect in a simple manner the adjustment or setting corresponding to the justification value of those mechanical devices on which the width of the separate elements of the text depends.

In general it will be advantageous not to distribute the missing lengths or the shortages among all the characters and spaces of the text, which shortages are determined for each line by noting the amount by which each line after it is written the first time falls short of the standard length decided upon, but only among spaces between the words. This may be effected by proportioning the amount of the lateral displacement of the paper relatively to the amount of the shortage at the end of each line by means of the device forming the subject of the present invention. By so doing a greater reliability in effecting the justification or equalization of the lines is obtained. Such a manner of distribution is supposed in the following description. Also it is taken that the lines are at first written too short and are then increased to the standard length by means of the said equalization.

The number of spaces between the words of each line and the amount of shortage at the end of each line may be read and counted at sight or may be registered mechanically on counters and noted down at the end of each line, if the text is also registered separately, so that the first type-writing of the text can take place a page at a time without interruption.

When the text has been type-written once and the equalization values have been found for each line of the same, the second type-writing of the text may take place by hand or automatically. If it is done automatically, a perforated strip will be made simulta-



neously with the first type-written text, which will be run through in the same or in a similar type-writer, as is usually done in the case of high-speed telegraphy, so that the mechanism of this latter type-writer, in which the device forming the subject of the present invention comes into action, experiences exactly the same movements as to the order in which the keys are pressed, as those of the type-writer when the text was written the first time.

More particularly, the present invention consists in a device for the justification or equalization of the lines of type-writing machines and the like, and in order that the details of construction and action of my invention may be more clearly understood reference is made to the accompanying drawings, in which one form of the device is shown, by way of example, on a type-writing machine, it being here taken for granted that the deficit or shortage is to be only distributed among the spaces between the words contained in the line which is to be equalized, and in which—

Figure 1 is an elevation of the device, and Fig. 2 is an elevation of part of the device, diagrammatically illustrating the action of the stop-lever. Fig. 3 is an elevation of one form of type-carrying means and devices connected therewith. Fig. 4 is an elevation and diagram of one part of the device, the same being actuated electrically. Fig. 5 shows in elevation an alternative form of Fig. 4, the same being actuated mechanically.

In Fig. 1, T denotes the platen-roll of the type-writer. The same is mounted on the carriage W, which slides over the wheels R' and R<sup>2</sup>. A quadrilateral rod S' is fastened to the carriage, said rod being pulled by a spring-barrel F' by means of a connecting-rod to the left. Said rod S' can only answer to this pull when the ball of the clutch or ball slide-stop K', which has been fixed, is moved by the rotation of the bell-crank lever H' in the direction of the arrow from the rod S' along the slope on which it runs and when the movable ball-stop K<sup>2</sup> does not already lie with its nose w against the vertical member of the bell-crank lever H<sup>3</sup>. At each pressure of the key while a type at the printing position is moved to the platen-roll a powerful spring F<sup>2</sup> is extended. Said spring is, on the one hand, attached to the horizontal member of the bell-crank lever H<sup>3</sup> and, on the other hand, is fastened to a rod S<sup>2</sup>, connected with the type-carrying means.

One of the many possible forms for the connection of the means carrying the type with the rod S<sup>2</sup> is represented in Fig. 3 for a type-writer in which a drum carries the type. Every time a key is pressed the so-called "universal rail" U, running under all the keys, which is fastened to a vertical rod S<sup>3</sup>, is

pressed down, and hereby the angular-shaped bearing L<sub>2</sub> of the drum T', to which latter the rod S<sub>2</sub> is suspended revolvably at its upper end, is moved in the direction of the arrow to the platen-roll.

A bearing-block L' is fastened to the rod S<sup>3</sup> near its lower end, in which a bell-crank lever H<sup>4</sup> is revoluble. The upper end of said lever is formed like a hook and is provided with a shoulder l, extending in a vertical direction to the plane of rotation of said lever. Further, a leaf-spring F<sup>4</sup> is attached by screws to the rod S<sup>3</sup>, which presses on the above-mentioned shoulder l, and thereby presses the latter to the rod S<sup>3</sup>. The bell-crank lever must therefore take up the position shown in full lines in its position of rest o. When the rod S<sup>3</sup> moves downward, and with it the bell-crank lever H<sup>4</sup>, the same takes with it the end of the rod S<sup>2</sup>, bent to the right, whereby the spring F<sup>2</sup> is expanded. Consequently the bell-crank lever H<sup>3</sup> executes a rotating motion until it hits with its nose u on the fixed stop t. The nose v after moving idle for a certain distance drives the one end of the rod L which is bent downward with it, said rod being mounted displaceably in the clutch or ball-stop K<sup>2</sup>, and the other end of the rod L thereby in the first place releases the lock made by the ball and then displaces the entire slide-stop a certain amount to the right. The mechanism of the type-writer is further so arranged that the connection of the rod S<sup>2</sup> with the means carrying the type is released simultaneously with the printing of the type, so that the bell-crank lever H<sup>3</sup>, together with the now-released spring F<sup>2</sup>, can return to its position of rest under the action of the weaker spring F<sup>3</sup>. For this purpose, as is seen in Fig. 3, a fixed stop A is arranged in the path of the left end of the said lever H<sup>4</sup>, so that the said end of the lever touches the stop at the same time the rod S<sup>3</sup> brings the type-drum into the position I. In the further motion of S<sup>3</sup>, therefore, the lever H<sup>4</sup> must rotate in the clockwise direction, whereby the spring F<sup>4</sup> is extended and the bent end of the rod S<sup>2</sup> is released. As mentioned above, the bell-crank lever H<sup>3</sup> can now return to its position of rest. The ball-stop K<sup>2</sup> remains in the position shown in dotted lines in Fig. 1, and simultaneously the ball of the ball-clutch K<sup>2</sup> is pressed between the sloping surface of the clutch and the rod S', as the end of the rod L which is bent downward is now released. As soon as the type is moved away from the platen-roll the bell-crank lever H' is rotated in the direction of the arrow by a suitable connection with the means carrying the type, the ball-lock of the ball slide-stop K' is released, and the rod S', together with the carriage W, is moved under the action of the spring F'. One form for the working of the bell-crank lever H' is likewise shown in the Fig. 3—namely, a catch-plate n



is placed on the rod  $S^3$ , which passes in its downward movement a detent  $k'$ , revoluble on the lever  $H'$  and pressed against the pin  $s$  by a spring. The said plate  $n$  drives detent  $k'$  only on its return, whereby the lever  $H'$  is then rotated in the clockwise direction. The detent  $k'$  is so bent and the pin  $s$  has such a position that said detent in going upward is brought to the right outside the engagement of the nose  $w$  shortly before returning to its uppermost position, and therefore the bell-crank lever  $H'$  can again return into its position of rest under the action of its spring. Hereupon the carriage moves so far to the left until the nose  $w$  strikes the vertical member of the bell-crank lever  $H^2$ , whereon the stop  $K^2$  is prevented from going farther. The bell-crank lever  $H^2$  is held fast continuously by the detent  $k$  when the text is written the first time, so that it cannot yield to the pressure of the nose  $w$ . When the text is written a second time, on the contrary, the detent  $k$  is released by the electromagnet  $E$ , for example, and the bell-crank lever  $H^2$  can then rotate under the pressure of the nose  $w$ .

One form of the electrical release of the detent  $k$  is shown in Fig. 4. Two contact-springs  $f_1, f_2$  are under the space-key and are connected with a source of current—e. g., a battery  $B$ , as well as with a lever-switch  $H_3$  and the electromagnet, as the figure shows. At each pressure of the key the springs  $f_1$  and  $f_2$  are electrically connected. If the lever-switch  $H_3$  is in its lower position, the magnet can be actuated, but not otherwise. This release can also be effected in other ways—e. g., as Fig. 5 shows. Here the detent  $k$  is formed as lever with two arms. The detent  $n_1$  of a rod  $S_1$  hits on the horizontal arm of said lever  $k$  as soon as the rod  $S_1$ , being jointed at its lower end with the space-key, is brought into the position shown in dotted lines by the lever  $H_3$  by means of a thrust-rod  $S_2$ . When said lever  $H_3$  is in the position shown in dotted lines, the justification can take place. Now when the detent  $k$  is released the device forming the object of the present invention comes into action to set the lateral feed of the paper corresponding to the amount of equalization. This device is formed by the slider  $g$  and the angle-iron  $P$ , on the horizontal arm of which the slider  $g$  slides, as well as by the bell-crank lever  $H^2$ . The vertical arm of the angle-iron  $P$  is movable in the frame or casing  $G$ . The manner in which the device works is easily seen in Fig. 2, which is formed from the corresponding part of Fig. 1 by the bell-crank lever being thought of as being replaced by an extended one-armed lever and the angle-iron  $P$  being arranged in another position.

The pivot  $o$  of the lever  $H^2$  is at a definite distance  $c$  from the path  $M-N$  of the nose  $w$ , and its value may be assumed as being equal to one interval between two words. The

distance  $f$  is made by setting the angle-iron  $P$  equal to the amount of shortage. The space  $n$ , Fig. 2, corresponds to the sum of intervals between the words, and if the number of the intervals between the words is denoted by  $z$ , then  $n = Z \cdot c$ —that is, for justifying the line the point of contact of slide  $g$  has to be removed from the initial point  $q$  a distance equal to  $c$  for each word-space. The nose  $w$  in acting on lever  $H^2$  will move through the distance  $X$  before lever  $H^2$  comes in contact with slide  $g$ , and it follows from the similarity of the two right-angled triangles that  $\frac{x}{f} = \frac{X}{n}$ ; that is,  $x = \frac{f \cdot X}{n}$  or  $x = \frac{f}{z}$ , which corresponds to the condition to be fulfilled—namely, that the proportionate fraction of the total shortage to be justified is added to the normal width of a word-space. Again, if the angle through which the lever  $H^2$  is allowed to move, depending on the position of the slide  $g$ , be denoted by  $O$ , then  $\frac{f}{n} = \tan. O$ , and therefore

$$n = \frac{f}{\tan. O} \quad n = \frac{\text{shortage}}{\text{tangent of } O} \quad 90$$

namely, the distance the slide  $g$  is moved from its zero position to the point contact between it and the lever is equal to the shortage to be justified divided by the tangent of the angle through which said lever moves from its normal position. Similarly, in the present case the distance of the point of contact of said slide with said lever from pivot  $O$  of said lever =  $\frac{\text{shortage}}{\text{sine of } O}$  100

The angular bar  $P$  and the slider  $g$  have to be set afresh before the commencement of each line the second time the text is written. While the drawings show this setting as to be operated by hand, any automatic means may be employed for this purpose without changing the scope of the invention. 105

While I have described in the foregoing specification the construction of parts preferred, I am aware that numerous changes of construction may be made without departing from the spirit and scope of my invention, and I therefore do not wish to be understood as limiting myself by the positive terms employed in connection with the description excepting such as the state of the art may require. 110

What I claim as my invention, and desire to secure by Letters Patent, is— 120

1. In machines of the type specified, means for enabling the length of the lines to be equalized consisting of step-by-step lateral spacing mechanism having a detent on the part to be spaced and a movable stop against which said detent abuts at the end of each step, a detent for normally maintaining said stop in its normal position, means for releasing said latter detent at the times when 125 130



it is desired to vary the amount of spacing effected during one step, a second stop for limiting the motion of the said movable stop after the release of said detent, and means for adjusting the position of said second stop in order to adjust the increase in the amount of spacing effected by the first stop moving from its normal position into that determined by the second stop.

2. In machines of the type specified, means for enabling the length of the lines to be equalized consisting of step-by-step lateral spacing mechanism having a detent on the part to be spaced and a movable stop against which said detent abuts at the end of each step, a detent for normally maintaining said stop in its normal position, means for releasing said latter detent at the times when it is desired to vary the amount of spacing effected during one step, a second stop for limiting the motion of the said movable stop after the release of said detent, and means for setting the said second stop in such a position that the distance moved through by the detent on the part to be spaced while moving the first-mentioned movable stop from its normal position into its final position determined by the second stop is equal to the shortage divided by the number of steps during which the spacing is to be increased.

3. In machines of the type specified, means for enabling the length of the lines to be equalized consisting of step-by-step lateral spacing mechanism having a detent on the part to be spaced and a revoluble lever against which said detent abuts at the end of each step, a detent for normally maintaining said lever in its normal position, means for releasing said latter detent at the times when it is desired to vary the amount of spacing effected during one step, an adjustable stop for limiting the motion of said lever after the release of said detent, the distance between the pivot of the lever and the point of contact between the detent on the part to be spaced and said lever being, when said lever is against said adjustable stop, equal to the distance between the pivot of the lever and the point of contact between said adjustable stop and said lever divided by the number of steps the spacing of which is to be increased, and the adjustable stop being set in such a position with regard to the pivot of the lever, that said distance between the zero position of said adjustable stop and the point of contact between said adjustable stop and the lever is equal to the shortage divided by the tangent of the angle through which the lever is turned from its normal position, determined by the releasable detent, to its final position determined by the said adjustable stop.

4. In machines of the type specified, means for enabling the length of the lines to be equalized consisting of step-by-step lateral spacing mechanism having a detent on

the part to be spaced and a revoluble lever against which said detent abuts at the end of each step, a detent for normally maintaining said lever in its normal position, means for releasing said latter detent at the times when it is desired to vary the amount of spacing effected during one step, an adjustable stop for limiting the motion of the said lever after the release of said detent, the perpendicular distance between the line of travel of the detent on the part to be spaced and the pivot of the lever being equal to the perpendicular distance between the line through the lever-pivot parallel to the line of travel of said detent and the point of contact between the adjustable stop and said lever divided by the number of steps the spacing of which is to be increased, and the perpendicular distance between lines, at right angles to said line of travel, through said point of contact and said lever-pivot being equal to the shortage.

5. In machines of the type specified, means for enabling the length of the lines to be equalized consisting of step-by-step lateral spacing mechanism having a detent on the part to be spaced and a revoluble member against which said detent abuts at the end of each step, a detent for normally maintaining said member in its normal position, means for releasing said latter detent at the times when it is desired to vary the amount of spacing effected during one step, an adjustable stop for limiting the motion of said member after the release of said detent, the distance between the pivot of the member and the point of contact between the detent on the parts to be spaced and said member being, when said member is against said adjustable stop, equal to the distance between the pivot of the member and the point of contact between said adjustable stop and said member divided by the number of steps the spacing of which is to be increased, and the adjustable stop being set in such a position with regard to the pivot of the member, that said distance between the zero position of said adjustable stop and the point of contact between said adjustable stop and the member is equal to the shortage divided by the tangent of the angle through which the member is turned from its normal position, determined by the releasable detent, to its final position determined by the said adjustable stop.

6. In machines of the type specified, means for enabling the length of the lines to be equalized consisting of step-by-step lateral spacing mechanism having a detent on the part to be spaced and a spring-pressed revoluble lever against which said detent abuts at the end of each step, a detent for normally maintaining said lever in its normal position, electrically-operated means for releasing said latter detent at the times when it is desired to vary the amount of spacing ef-



5 fected during one step, an adjustable stop  
 for limiting the motion of said lever after  
 the release of said detent, the distance be-  
 tween the pivot of the lever and the point of  
 10 said lever against which the detent of the  
 part to be spaced abuts, being, when said  
 lever is resting against said adjustable stop,  
 equal to the distance between the pivot of  
 the lever and the point of contact between  
 15 said adjustable stop and said lever, divided  
 by the number of steps the spacing of which  
 is to be increased, and the adjustable stop  
 being set in such a position with regard to  
 the pivot of the lever, that said distance be-  
 20 tween the zero position of said adjustable stop  
 and the point of contact between said adjust-  
 able stop and the lever is equal to the shortage  
 divided by the tangent of the angle through  
 which the lever is turned from its normal po-  
 sition, determined by the releasable detent,  
 to its final position determined by the said  
 adjustable stop.

7. In machines of the type specified,  
 means for enabling the length of the lines to

be equalized consisting of step-by-step lateral 25  
 spacing mechanism having a detent on the  
 part to be spaced and a movable stop against  
 which said detent abuts at the end of each  
 step, a detent for normally maintaining said  
 stop in its normal position, means for releas- 30  
 ing said latter detent at the times when it is  
 desired to vary the amount of spacing effected  
 during one step, a second stop for limiting  
 the motion of the said movable stop after  
 the release of said detent, an adjustable 35  
 member on which said stop is adjustably  
 mounted, said member being rectilineally  
 adjustable in a direction at right angles to the  
 line of travel of the detent on the part to be  
 spaced, and said stop being rectilineally ad- 40  
 justable on said member in a direction par-  
 allel to said line of travel and means for de-  
 termining the distances in which said mem-  
 ber and stop have to be adjusted.

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Witnesses:

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