Aug. 20, 1935. W. O. BELL 2,011,887

APPARATUS FOR OBTAINING VARIABLE SPACING FOR TYPEWRITERS AND THE LIKE

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Fig. 1.

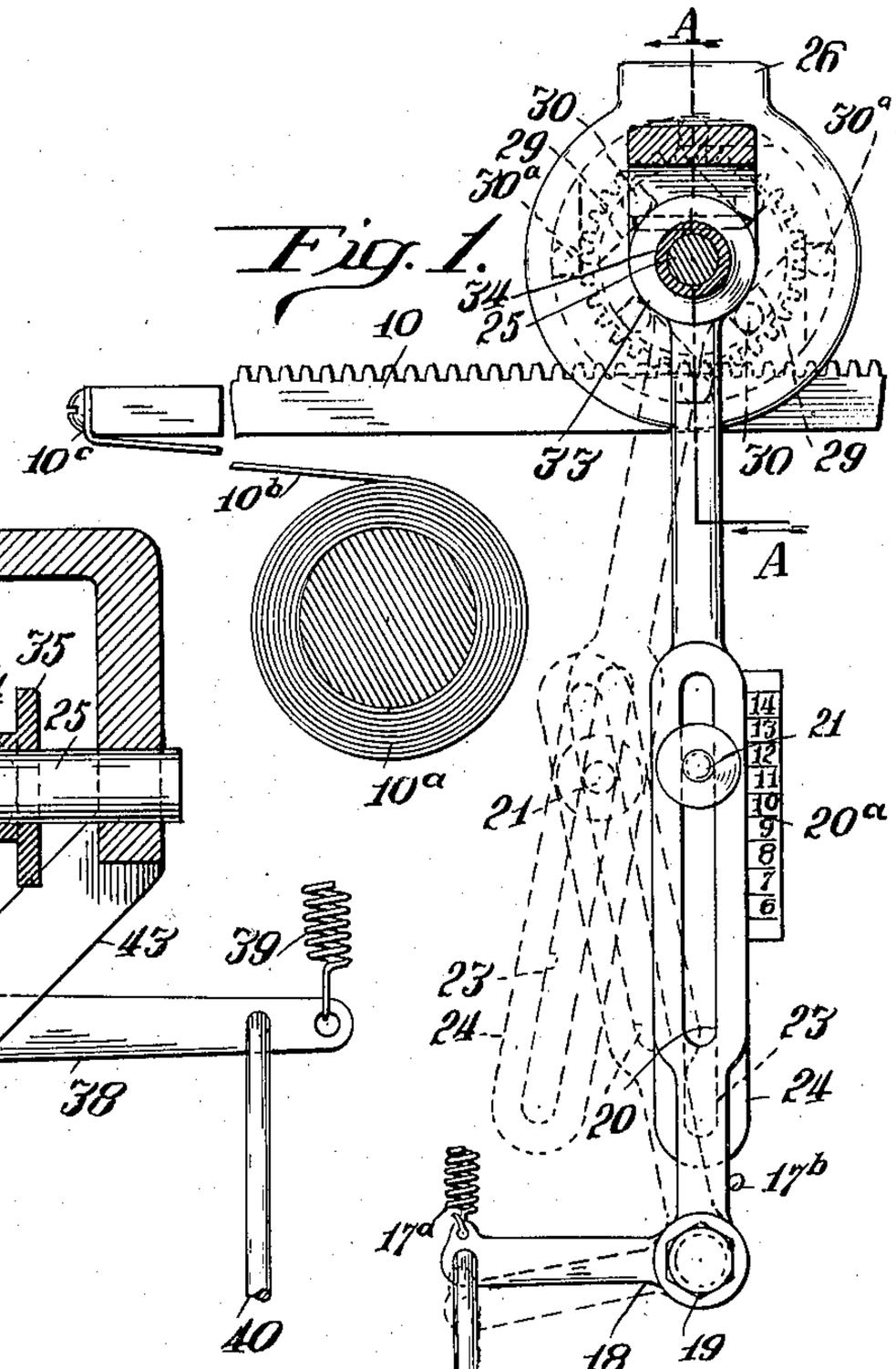

Fig. 2.

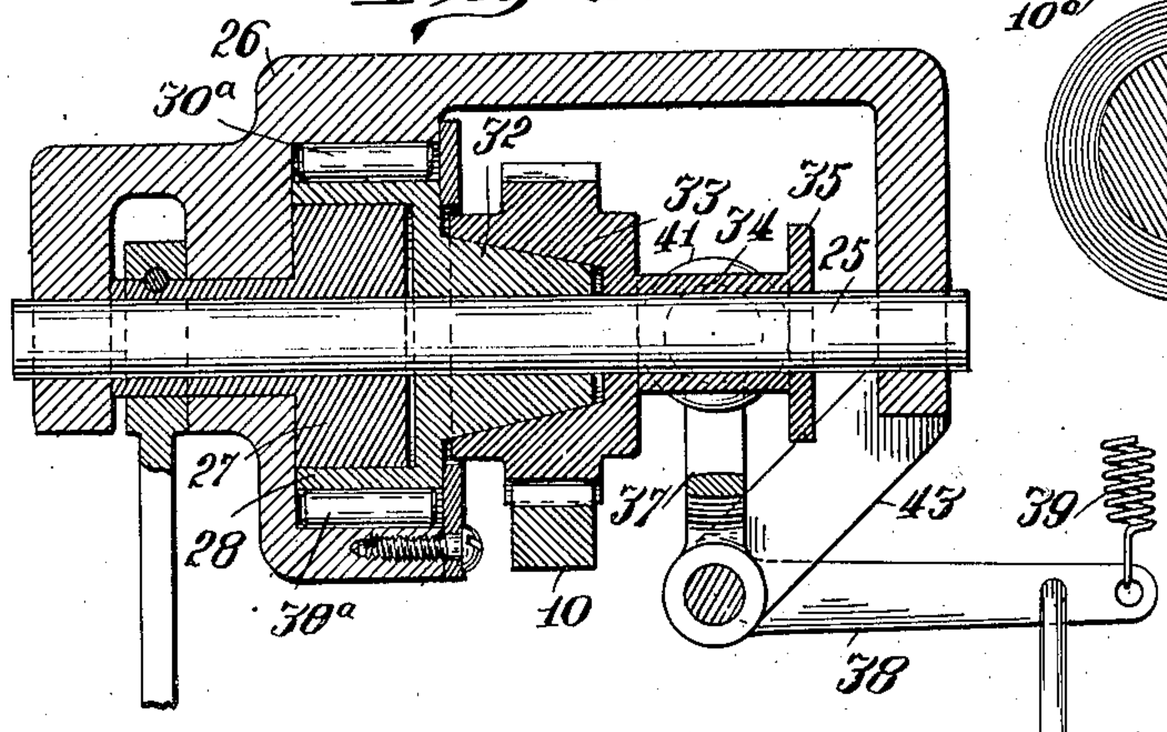

Fig. 3.

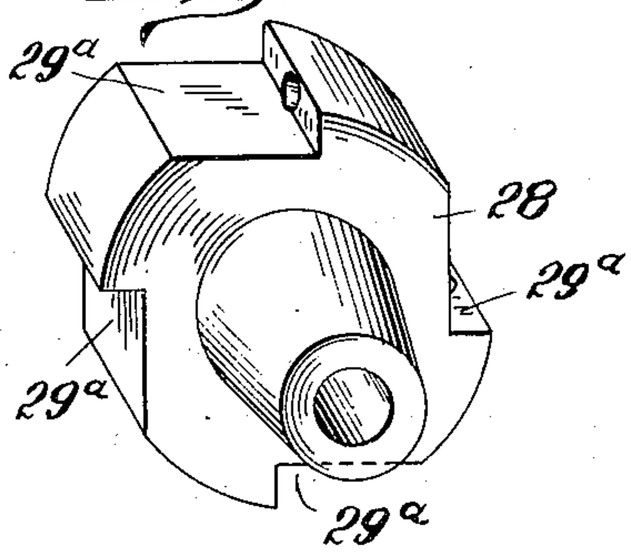

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Fig. 5.

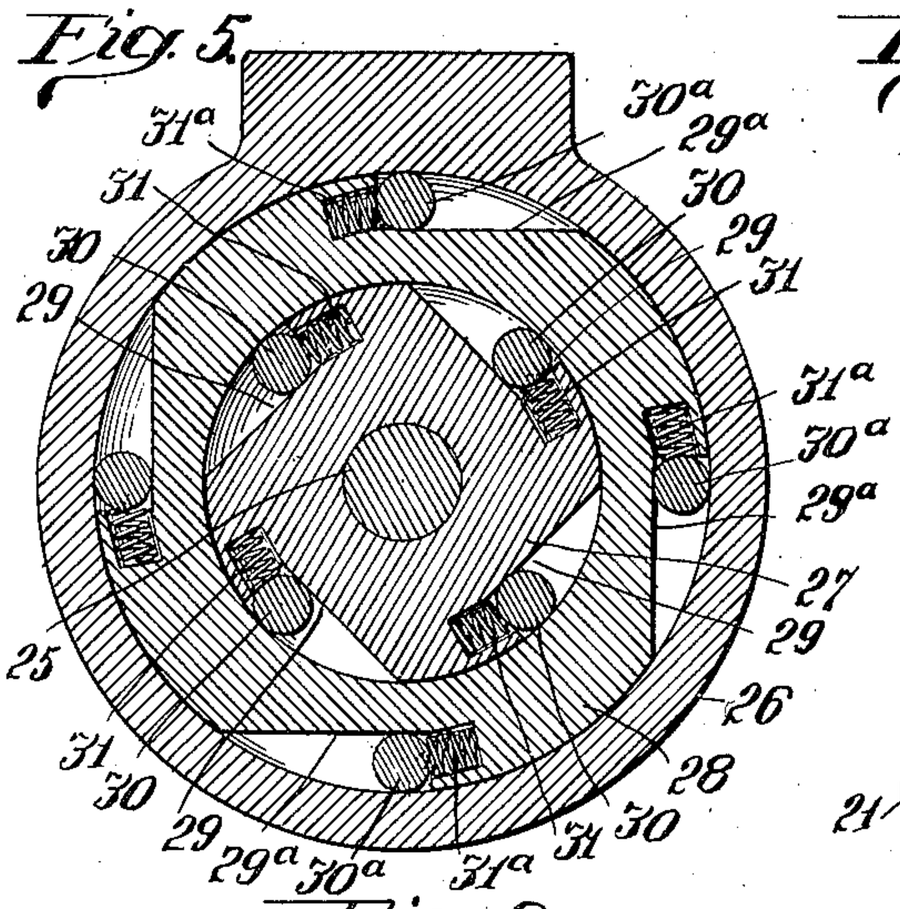
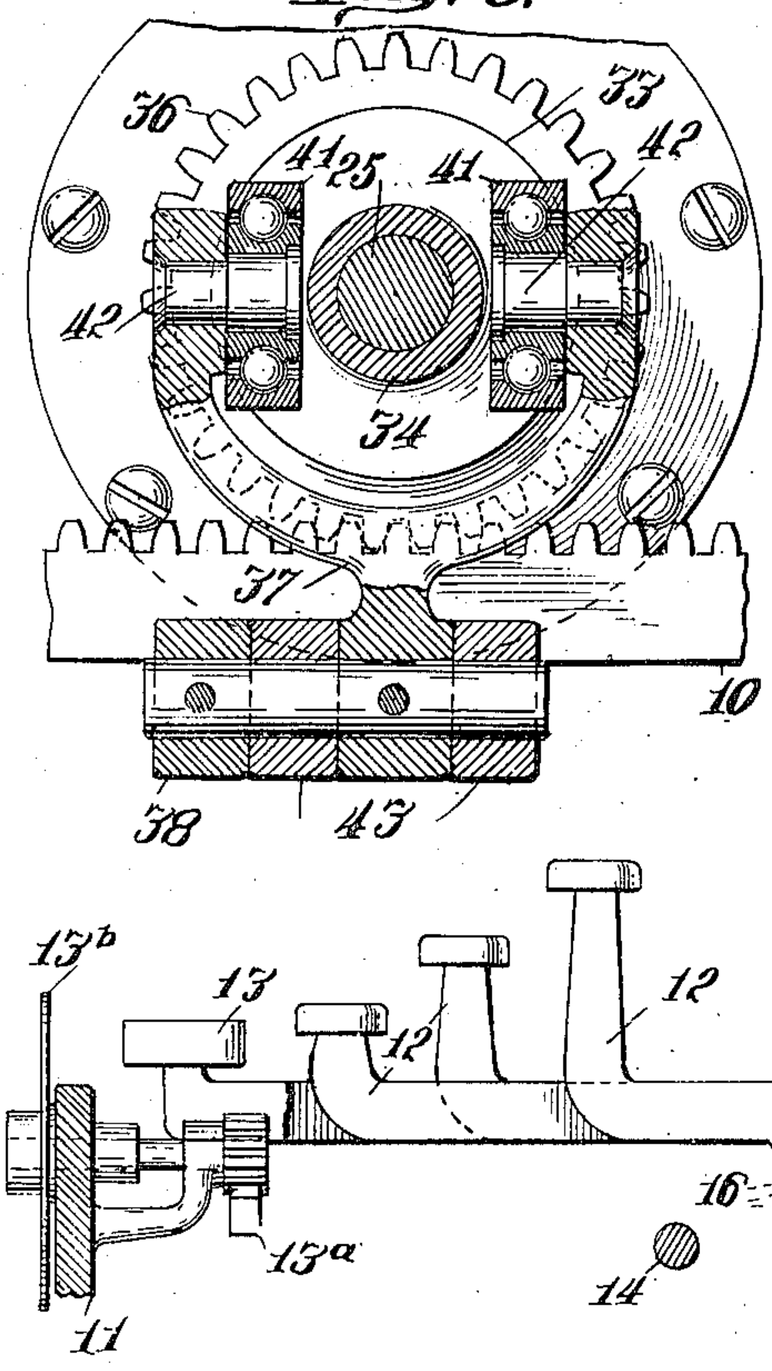


Fig. 6.



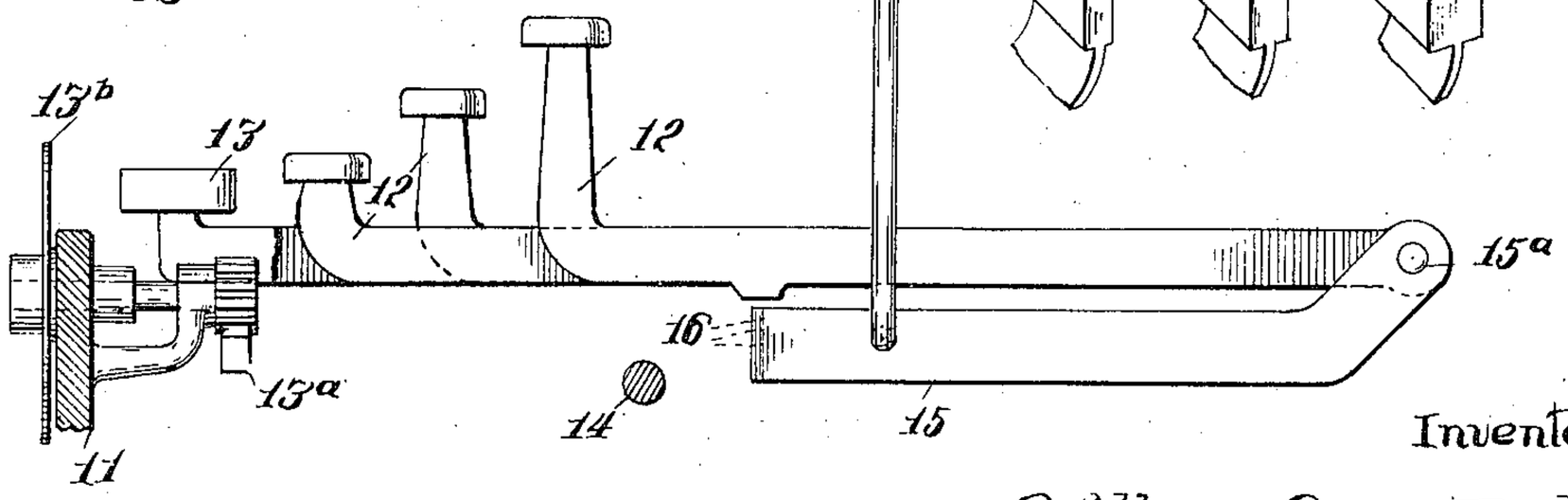


Fig. 4.

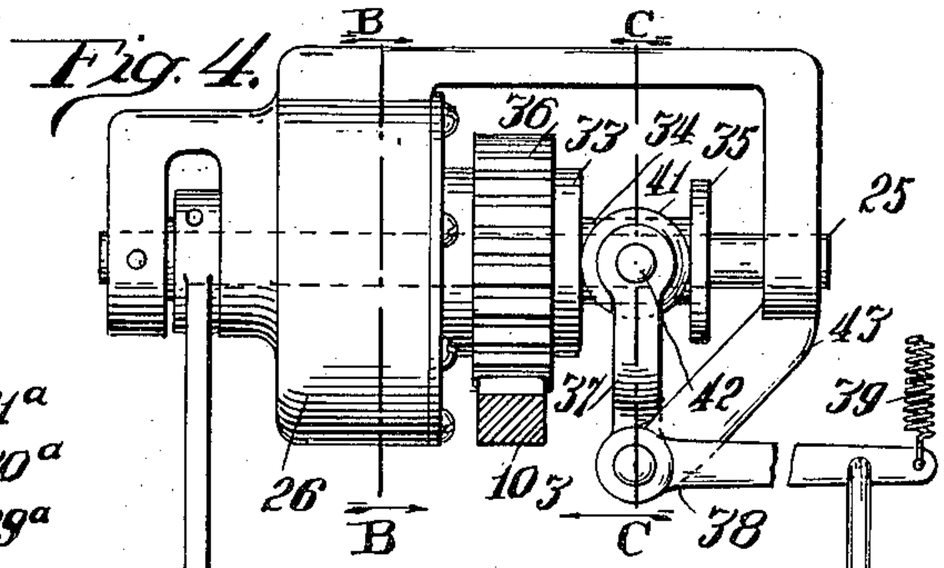


Fig. 7.

Fig. 8.

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APPARATUS FOR OBTAINING VARIABLE SPACING FOR TYPEWRITERS AND THE LIKE

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Fig. 12.

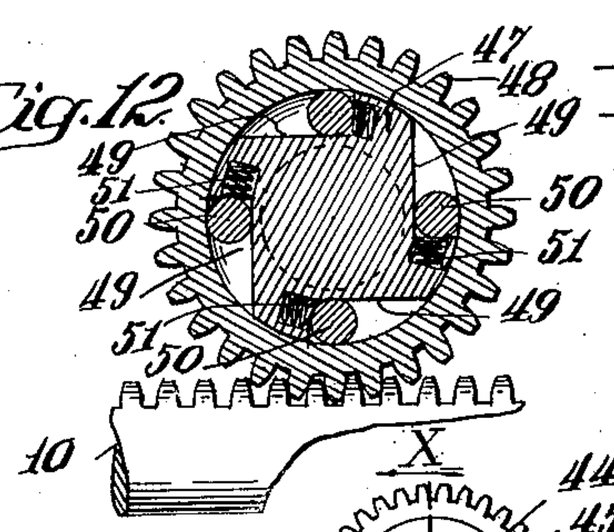


Fig. 11.

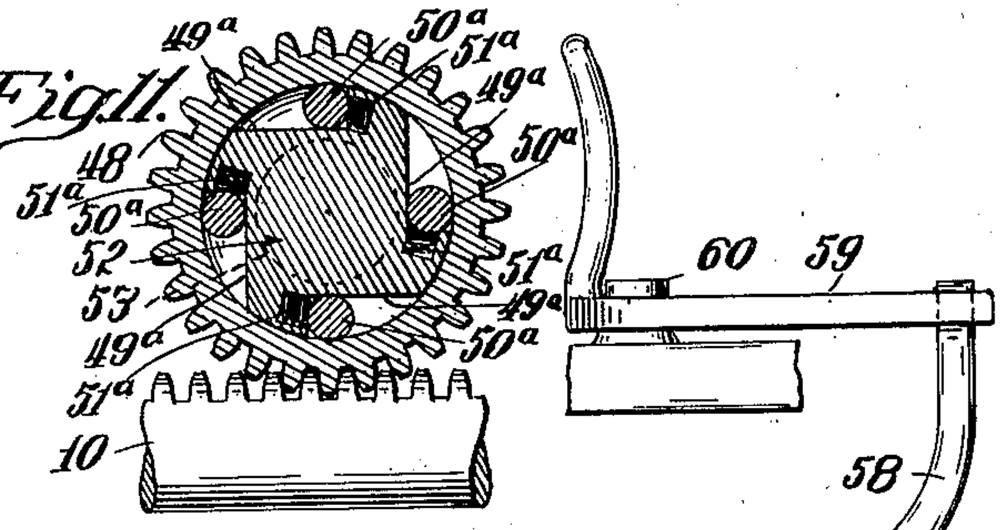


Fig. 9.

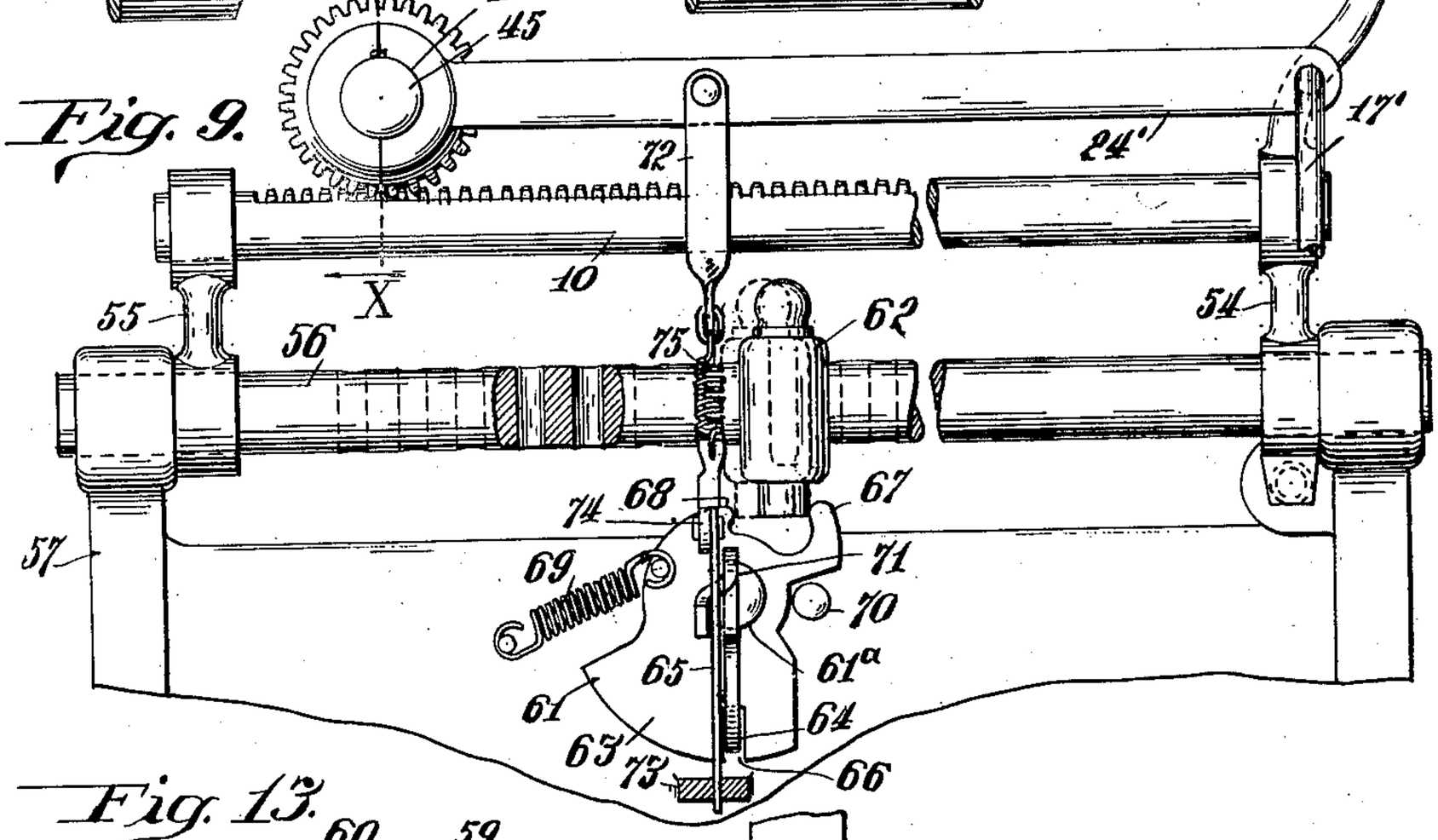


Fig. 13.

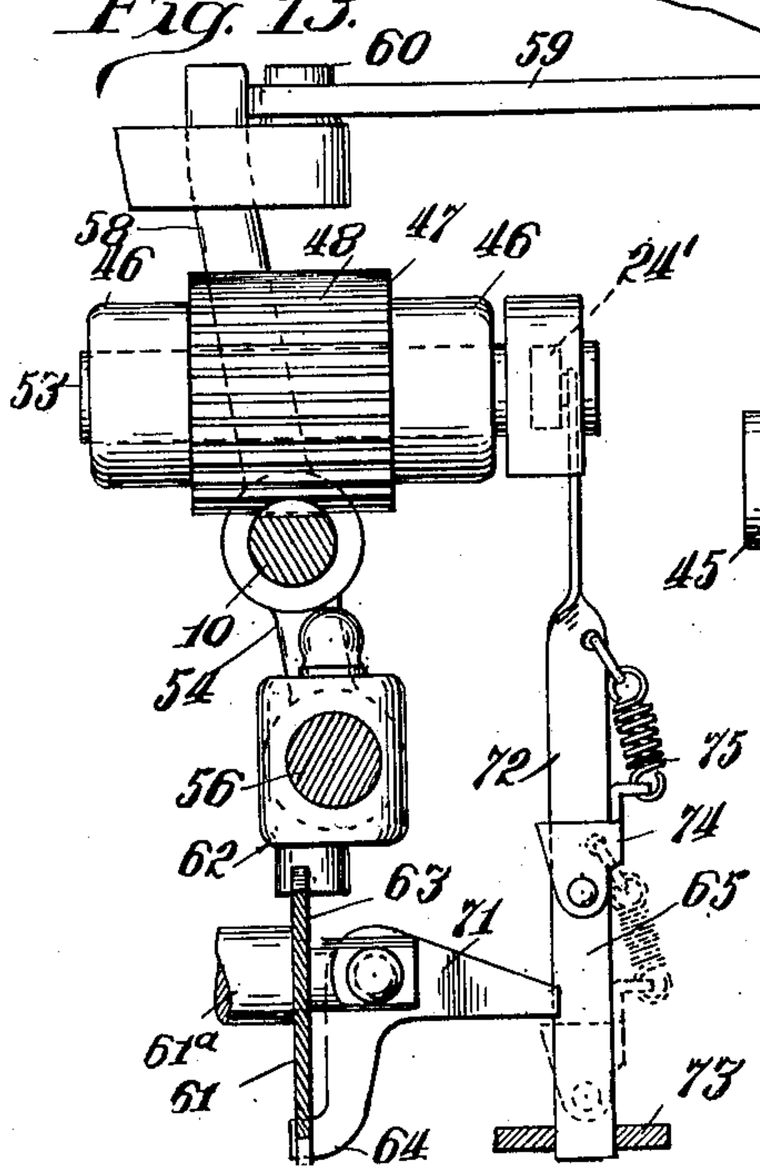
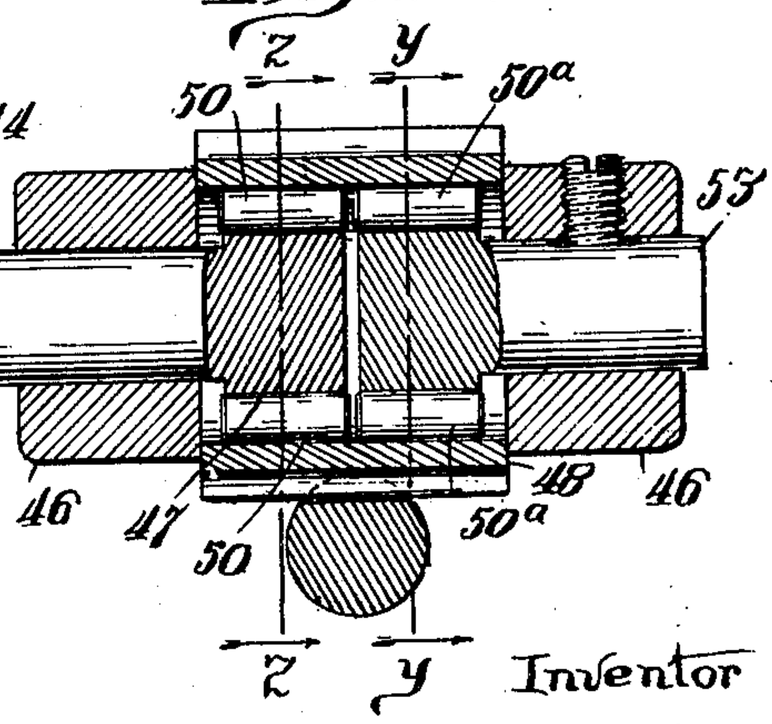


Fig. 10.



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Patented Aug. 20, 1935 2,011,887

UNITED STATES PATENT OFFICE

2,011,887

APPARATUS FOR OBTAINING VARIABLE SPACING FOR TYPEWRITERS AND THE LIKE

William Oscar Bell, Chicago, Ill., assignor to Robert H. Loomis, Chicago, Ill.

Application March 3, 1932, Serial No. 596,551

10 Claims. (Cl. 197—84)

This invention relates to a typewriting machine; and its principal object is to provide a typewriting machine of new and improved construction by which it is possible to produce a typewritten page which in composition will have the appearance of a page printed by a printing press.

In the ordinary typewriting machine, uniform spacing is allotted to all characters. The m's and w's, for example, occupy the same space provided for periods and commas, whereas the type faces used in printing presses are of widths which correspond to the actual widths of the characters.

In such typewriting machines, this uniform spacing is ordinarily accomplished by means of a pawl and ratchet escapement mechanism which cooperates with a toothed rack located on the carriage, the latter of which is under spring tension. As each character is struck, the spring pulls the carriage to the left as far as the escapement mechanism will permit.

The typewriting machine to which this invention is to be applied is generally of the same construction of the ordinary typewriter. The type faces, however, are of varied widths, according to the space normally occupied by the respective characters and a separate type lever and key is provided for each character.

This invention provides specifically a control mechanism for the typewriter carriage, whereby the extent of the movements of the carriage are made dependent upon the width of each particular character.

The invention also provides for movements of the carriage of any desired amplitude, so that the words may be spaced as desired for the justification of the lines.

A further object is to provide mechanism for control of the carriage, whereby a perfect vertical alignment of the left hand edges of the initial letters of successive lines may be obtained instead of the comparative irregularity resulting in the use of the ordinary typewriter from the fact that all the characters occupy equal spaces.

In the drawings:

Fig. 1 is a front elevation of the mechanism, partly in section, applied to a typewriter, a fragment only of the latter being shown.

Fig. 2 is a vertical section through line A—A of Fig. 1.

Fig. 3 is a perspective view of one of the clutch elements.

Fig. 4 is a side elevation of the parts shown in Fig. 1.

Fig. 5 is a vertical section through line B—B of Fig. 4.

Fig. 6 is a section through line C—C of Fig. 4.

Fig. 7 illustrates the uniform type faces ordinarily used on typewriters.

Fig. 8 shows the type faces used in connection with the present invention which are of varied widths according to the space normally occupied by the respective characters.

Fig. 9 is a front elevation of a portion of the mechanism applied to a typewriter, a fragment only of the latter being shown.

Fig. 10 is a vertical section through line *x*—*x* of Fig. 9.

Fig. 11 is a section on line *y*—*y* of Fig. 10.

Fig. 12 is a section on line *z*—*z* of Fig. 10.

Fig. 13 is a side elevation of the parts shown in Fig. 9.

Figs. 1 and 4 show the ordinary typewriter carriage rack 10, a portion of the typewriter frame 11 (Fig. 4), the key levers 12, the space key 13 and the key lever stop 14, all of which are of ordinary construction. The space key 13 is provided with a stop bar comprising an adjustable wedge 13ª geared to a dial 13ᵇ, the latter of which is pivotally mounted to the typewriter frame 11. A drum 10ª secured to a fixed part of the machine contains a spring 10ᵇ. The free end of spring 10ᵇ is attached to the carriage rack 10 at 10ᶜ so as to be stressed by the forward movements of the carriage.

Extending horizontally under the key levers 12 and extending above the stop bar 14 is a yoke 15 fulcrumed to the frame of the typewriter at 15ª. The portion of the yoke 15 under the key levers 12 is formed with a series of steps 16. The particular key levers 12 which represent the type faces of greatest width are positioned over the topmost of the steps 16; the particular key levers 12 representing the type faces of the next greatest width are positioned over the next step, and so on down to the key levers representing the smaller characters, e. g. the period and the colon, which are positioned directly over the bottom step of steps 16. In other words there are as many steps as there are variations in width of the type faces, the key levers for the narrower faces being over the lower steps and those for the wider type faces being over the higher steps.

Extending vertically from the side of the yoke 15 is a bar 17 secured at its upper end to a bell-crank lever 18 the latter of which is pivoted to the frame of the typewriter at 19 and maintained in its initial operating position by a tension spring 17ª, interposed between the lower

lever arm and fixed part of the machine (not shown) which spring holds bellcrank lever 18 against a stop 17b constituting a fixed part of the machine.

The upper arm of bellcrank lever 18 is formed with a slot 20 in which is adjustably clamped a thumb screw 21 provided with a pivot pin 22. Pivot pin 22 projects into a slot 23 on the lower end of a lever arm 24 which is fixed at its upper end to a shaft 25. By raising or lowering the thumb screw 21 in the slot 20 the effective lengths of lever arm 24 and the upper end of bellcrank lever 18 are thereby varied. An indicator 20a may be secured in any suitable manner to either arm and properly calibrated to accurately indicate the various positions of adjustment. The adjusting mechanism just described relates to the set size of the type font employed in the machine, as will be hereinafter more fully explained.

The shaft 25, above referred to, is journaled in a casing or housing 26, the latter of which encloses a clutch driving mechanism which is best illustrated in Figs. 2 and 5. The clutch driving mechanism comprises a driving element 27 which is fixed to the shaft 25 and a holding element 28 which is journaled on the shaft 25. Holding element 28 is of larger diameter than the driving element 27 and is recessed at its central portion to receive said driving element.

The driving element 27 is preferably provided on its periphery with a series of right angle notches 29, each having unequal sides the shortest side of which extends toward the central portion of the driving element 27 and the longest side of which, when reference to Fig. 5, extends in a counterclockwise direction to the periphery of the driving element 27. Each of the notches 29 is provided with a roller 30 which is of slightly less diameter than the greatest depth of the notch. The rollers 30 are pressed away from the short sides of the notches 29 and against the inner surface of the driven element 28 by springs 31 positioned in the driving element adjacent each of the short sides of the notches 29.

When the driving element 27 is rotated in clockwise direction, with reference to Figs. 1 and 5, the action of the springs 31 against the rollers 30 combined with the action in the same direction of the inner surface of the holding element 28 against the rollers 30 causes a binding engagement between the driving element 27 and the holding element 28. When the driving element 27 is rotated in the reverse direction the rollers 30 are directed against the springs 31 and there is no clutching engagement, the holding element 28, therefore, remaining stationary.

The holding element 28 is also provided on its periphery with like notches 29a having like rollers 30a and like springs 31a, the only difference being that the notches 29a extend in a direction opposite that of the notches 29 on the driving element 27. The rollers 30a on holding element 28 are adapted to bind against the inner surface of the casing 26 and thereby prevent retrograde, or, with reference to Fig. 5, counter-clockwise movement of the holding element 28.

Interposed between the holding element 28 and the carriage rack 10 is a second clutch mechanism releasably engaging said holding element 28 with the carriage rack 10. This second clutch mechanism comprises a male element 32, which may be formed integrally with the holding element 28, and a female element 33 journaled to the shaft 25 and formed with a sleeve portion 34, to the latter of which is secured an operating mechanism hereinafter described. The sleeve portion 34 is formed on its outer end (Fig. 2) with a radially extending flange 35. The female member 33 is formed on its outer periphery with gear teeth 36 adapted to mesh with the teeth of the carriage rack 10.

The operating mechanism for the second clutch mechanism comprises a yoke 37, a bellcrank lever 38, a tension spring 39, and a lever arm 40. The yoke 37 is positioned adjacent the sleeve portion 34 and is provided with rollers 41, secured thereto by pins 42, which rollers bear against the female clutch element 33 on one side and against the sleeve flange 35 on the other side. The yoke 37 comprises the end of the upper arm of bellcrank lever 38, the latter of which is pivoted to a flange 43 depending from the clutch casing 26. The tension spring 39 is interposed between the lower arm of bellcrank lever 38 and a fixed part of the machine (not shown) and maintains an upward tension on said arm. This tension holds the female element 33 of the second clutch mechanism in frictional engagement with the male element 32. Lever arm 40 extends downwardly from the outer portion of the lower arm of bellcrank lever 38 and is operated by a key or other mechanism (not shown) which pulls the lower arm of the bellcrank lever 38 downwardly thereby releasing the elements of the second clutch mechanism to permit the return of the carriage to its initial operative position.

The operation of the apparatus is as follows:

When a key lever 12 is depressed to the stop bar 14, it will swing the yoke 15. Since, as heretofore described, the key levers 12 are positioned over the steps 16 of the yoke 15 in proportion to their respective widths, the key levers which actuate the type faces of greatest width, will impart a greater swing to the yoke 15 than those actuating the type faces of less width. Consequently the amount of swing imparted to yoke 15 is proportionate to the width of the character struck.

As yoke 15 is thus actuated, it carries with it rod 17 which in turn operates bellcrank lever 18 to swing lever arm 24. Lever arm 24 rotates shaft 25 and operates the clutch mechanism.

Before describing the operation of the clutch mechanism, it should be noted that the amount of swing imparted to lever arm 24 may be adjustably varied by thumb screw 21 and pivot pin 22. If it becomes necessary to provide the machine with a complete new font of type faces of a different set size, that is, of a proportionately increased or decreased width, the apparatus must be adjusted accordingly. If the set size of the new font type is smaller, the adjustment is made by sliding thumb screw 21 and pivot pin 22 downwardly in slots 20—23, thereby reducing the swing of lever arm 24. By raising thumb screw 21 and pivot pin 22 the swing of lever arm 24 is increased to accommodate a new font of type of larger set size.

The clutch mechanism operates as follows:

As shaft 25 is rotated by lever arm 24 in clockwise direction, with reference to Figs. 1 and 5, it carries with it the clutch driving element 27. As the driving element 27 moves in clockwise direction, the rollers 30 bind against the inner surface of holding element 28 and the holding element 28 is thereby rotated with the driving element 27. The binding engagement between the rollers 30 and the holding element 28 is effected by virtue of the tendency of the com-

pression springs 31 to force the rollers 30 toward the narrower portion of the notches 29 combined with the tendency of the rollers, through frictional resistance with the holding element 28, to move in the same direction. The holding element 28 rotates freely in this direction, since the rollers 30a of the holding member 28 are forced, through frictional resistance with the casing 26, against the springs 31a and hence out of binding engagement. This movement of the holding element 28 is transmitted to the carriage rack 10 through the male and female elements 32 and 33 of the second clutch mechanism which parts are normally held in operating engagement by the spring 39 acting through the bellcrank lever 38 and yoke 37.

When the key lever 12 is released, the tension spring 17a returns the yoke 15, the shaft 25 and the intermediate elements into their respective initial operating positions. The shaft 25 and the driving member 27 return freely to the initial position by virtue of the frictional resistance of the rollers 30 with the holding element 28, forcing the rollers 30 against the springs 31 or out of binding engagement.

The holding element 28, however, is held in its advance position by the combined action of the rollers 30a which prevent retrograde movement and the spring 10b which has been stressed by the advance movement of the carriage.

After a series of characters forming a word have been struck and have imparted a series of positive advance movements to the carriage, the space key lever 13 is depressed and in like manner advances the carriage. The amplitude of movement which the space key lever thus imparts to the carriage depends upon the position of the wedge 13a which comprises the stop bar for said space key lever 13. By turning the dial 13b, the wedge 13a may be adjusted so that the space between the words may be of any desired amplitude. If, however, the operator desires to justify the lines, he may do so by first typing the line out experimentally and dividing the amount of surplus space at the end of the line by the number of spaces between the words, obtain a figure representing an amount by which each space must be increased to obtain complete justification of the line. By then adjusting the dial 13b according to the amount of increase desired for each space, the operator will obtain the desired result by re-writing the line.

To return the carriage rack 10 to its initial operating position after a line has been written, the operator depresses a key (not shown) which pulls a rod 40 downwardly. This operates bellcrank lever 38 which, in turn, slides female element 33 out of engagement with male element 32. With these elements out of engagement the carriage may be readily returned to the initial operating position.

In the modified form of the invention, as illustrated by Figs. 9 to 13, the only material variations are in the construction of the clutch mechanism. The rod 17' corresponds to rod 17 of Fig. 1, and is connected with the keyboard of the machine in like manner. The upper end of rod 17' is secured to one end of the lever arm 24', the latter of which corresponds to lever arm 24, Fig. 1, with the exception that the adjusting mechanism for varied set sizes of type font, having already been shown in connection with the preferred embodiment of the invention, is here omitted, for purposes of simplicity. Lever arm 24' is fixed at 44 to one end of a shaft 45, the latter of which is journaled at 46 to a fixed part of the machine. To the opposite end of the shaft 45 is keyed a clutch member 47 which extends into a ring gear 48. Clutch member 47 is provided with notches 49, rollers 50 and compression springs 51, all of which are of the same construction as notches 29, rollers 30, and springs 31, hereinabove described in connection with the preferred embodiment of the invention. Clutch member 47 comprises the driving element of the clutch mechanism in the modified form of the invention and is adapted to engage the inner surface of ring gear 48, when the shaft 45 is rotated in clock-wise direction with reference to Figs. 9, 11 and 12. A second clutch member 52, of the same construction as clutch member 47, is also positioned within the ring gear 48, and is keyed to one end of a stub shaft 53, the latter of which is keyed to a fixed part of the machine. The second clutch member 52 constitutes a holding element and is a modification of the holding element 28 in the preferred embodiment of the invention and is provided with notches 49a, rollers 50a, and springs 51a, which are adapted to prevent retrograde movement of the ring gear 48. This holding function acts in the same way as hereinabove described in connection with holding element 28 of the preferred embodiment.

To provide for the return of the carriage to the initial operating position the carriage rack 10 is pivotally mounted by means of connecting rods 54 and 55 on a bar 56. The carriage rack 10 is held in normal engagement with the ring gear 48 by a spring or other suitable means (not shown). Bar 56 is mounted on the carriage 57 and is preferably positioned below and somewhat in front of the carriage rack 10 with reference to Fig. 9. Connecting rod 55 is extended vertically to form a lever arm 58 which is actuated by a hand lever 59 to swing the carriage rack 10 out of engagement with the ring gear 48. The hand lever 59 is fulcrumed to a stop 60 which is fixed to the carriage 57.

After the return movement of the carriage rack 10 it is placed in meshed engagement with the ring gear 48 at identically the same initial operating position by means of a stopping and tripping mechanism 61 which is secured to a fixed part of the machine 61a and a stop 62 which is adjustably secured to the bar 56. The stopping and tripping mechanism 61 comprises a gauge plate 63, a holding pawl 64 and a trip 65. The gauge plate 63 is pivoted to a fixed part of the machine and is formed with a slot 66, a carriage return stop 67, and a carriage advance stop 68. Interposed between the gauge plate 63 and a fixed part of the machine is a tension spring 69 adapted to be stressed when the gauge plate 63 is rotated in clockwise direction with reference to Fig. 9. Adjacent the opposite edge of the gauge plate 63 is a stationary stop 70 so positioned as to limit the movement of the gauge plate 63. The holding pawl 64 comprises one end of a bellcrank lever 71 pivotally mounted to a fixed part of the machine and so positioned that the pawl 64 will engage the slot 66 of gauge plate 63 when the latter is rotated. The trip 65 comprises an arm 72 fixed at one end to the lever arm 24a, the other end of which extends through a guide 73 secured to a fixed part of the machine. Pivotally mounted on the arm 72 is a dog 74. The dog 74 is held in operative position by a tension spring 75.

The operation of the modified form of the invention is as follows:

As the movements of the type keys 12 impart motions of varied amplitude to arm 17', as hereinbefore described in connection with the preferred form of the invention, these movements are imparted to the shaft 25 through lever arm 24'. Upon downward movement of lever arm 24' the shaft 35 is rotated in clockwise direction with reference to Fig. 9, and carries with it clutch member 47 which constitutes the driving element of the modified form of the invention. As clutch element 47 rotates in clockwise direction it carries with it the ring gear 48 by virtue of the binding engagement between the rollers 50 and the inner surface of the ring gear 48 as hereinbefore fully described in connection with the preferred embodiment of the invention. As ring gear 48 advances in clockwise direction with reference to Figs. 9, 11 and 12, it transmits the movement of the carriage rack 10 and stresses tension spring 10b. Clutch element 52, however, remains stationary, since this clockwise movement of ring gear 48 directs the rollers 50a against the springs 51a or out of binding engagement. When the key lever 12 is released and the rod 17' and the arm 24' are returned to their normal positions by virtue of spring returning means (not shown) the shaft 45 is rotated in counter-clockwise direction and carries with it clutch element 47. Ring gear 48, however, remains in the advance position and is prevented from retrograde movement by the clutch element 52. As hereinabove described, any advance movement of the ring gear 48 will be opposed by the spring 10b which is tensioned by the advance movement of the carriage.

When the carriage is advanced as far as desired the operator swings carriage rack 10 out of engagement with ring gear 48 by means of lever 49. As soon as carriage rack 10 is released from engagement with ring gear 48 the tension of spring 10b will tend to draw the carriage back into the initial operating position. As the carriage slides back from left to right, stop 62, which was originally adjusted to the desired position, strikes the carriage return stop 67 and rotates gauge plate 63 to stationary stop 70, which movement causes pawl 64 to slip into engagement with slot 66 of gauge plate 63. At this point hand lever 59 is released and carriage rack 10 is drawn by springs or other suitable means (not shown) back against the ring gear 48. As will readily be seen the exact point that the carriage rack 10 will contact the teeth of ring gear 48 cannot be determined. The teeth may immediately mesh or they may rest against each other without meshing. Therefore, when the carriage rack 10 and the ring gear 48 are brought into contact, but not necessarily in mesh, the stop 62 is touching or at least quite close to carriage return stop 67. By now striking the space key 13 the rod 17' is depressed and the carriage is advanced until the stop 62 strikes advance stop 68. This advance movement will bring the teeth in mesh, if necessary, and will also advance the carriage to a definite and predetermined position, namely, the point fixed by stop 62 with relation to slot 66 and carriage advance stop 68. As rod 17' is depressed it will be noted that the rod 72 is also depressed, carrying with it dog 74 which in the lower movement passes below the upper arm of bellcrank lever 71, as shown in dotted lines, Fig. 13, and on the upward or release movement, the dog 74 will trip pawl 64 and gauge plate 63 will be rotated by tension spring 69. Carriage advance stop 68 will thereby be moved out of engagement with stop 62 and the slot 66 and pawl 64 will not return into engagement. The carriage is now in the identical initial position as it was for the previous line and the left hand edge of the first letter struck will be in perfect vertical alignment with the left hand edge of the first letter of the preceding line. Obviously if it is desired to indent as, for example, to start a new paragraph, the initial starting position of the carriage is the same and the first key struck is the space key adjusted, as hereinbefore described, to advance the carriage any desired amplitude.

Although in describing and claiming the invention, the word "typewriter" has been used, it is not the intention to limit the invention to typewriters in the ordinary use of the term, as the invention is applicable to other apparatuses for registering character impulses on impulse receiving material wherein the size of the characters are varied or wherein it is desirable to gauge or vary the distance between characters or a group of characters to a high degree of accuracy.

Also it is to be understood that the term "friction clutch" as employed herein, is used in its broad sense as including any clutch, such as a magnetic or induction clutch, wherein the engagement is not established by teeth or pins as in a positive clutch.

The above described preferred form and modified form of the invention do not constitute all possible forms, as it is obvious that changes may be made therein within the scope of the invention as defined in the following claims.

I claim:

1. In a typewriting machine, the combination of a movable carriage, a plurality of type faces having varied widths according to the space normally occupied by the respective characters, a key operating mechanism for said type faces, a clutch mechanism interposed between the key operating mechanism and the carriage, said clutch mechanism comprising a driving element operated by the key mechanism and a holding element in releasable engagement with the carriage, means for varying the amplitude of the movements of the holding element of the clutch in proportion to the widths of the type faces and an adjusting device for varying the amplitude of the movements of the carriage according to the set size of the type font employed.

2. In a typewriting machine, the combination of a movable carriage, a plurality of type faces having varied widths according to the respective characters which they represent, a key operating mechanism for selectively transmitting type impulses to impulse receiving material, means comprising a clutch mechanism for imparting to the carriage positive advance movements, said mechanism comprising an internally positioned driving element, an externally positioned holding element, a one-way clutch comprising spring pressed rollers engaging between the driving element and the holding element, a casing enclosing the driving and holding elements, a one-way friction clutch between the holding element and the casing adapted to prevent retrograde movement of said holding element, means interposed between the keys and the clutch mechanism for varying the movement of the clutch according to the character struck, said means comprising a yoke positioned horizontally underneath the key levers and having a stepped portion adapted to be engaged by the key levers located above the steps to

impart a variable swing to said pivot arm, and a rod connecting the yoke with the clutch mechanism, said rod being provided with means for transmitting to the driving element of the clutch the varied movements of the yoke.

3. In a typewriting machine, the combination of a movable carriage, a plurality of type faces having varied widths according to the respective characters which they represent, a key operating mechanism for selectively transmitting type impulses to impulse receiving material, means comprising a clutch mechanism for imparting to the carriage positive advance movements, said mechanism comprising an internally positioned driving element, an externally positioned holding element, a one-way clutch comprising spring pressed rollers engaging between the driving element and the holding element, a casing enclosing the driving and holding elements, a one-way friction clutch between the holding element and the casing adapted to prevent retrograde movement of said driven element, means interposed between the keys and the clutch mechanism for varying the movement of the clutch according to the character struck, said means comprising a yoke positioned horizontally underneath the key levers and having a stepped portion adapted to be engaged by the key levers located above the steps to impart a variable swing to said yoke, a rod connecting the yoke with the clutch mechanism, said rod being provided with means for transmitting to the driven element of the clutch the varied movements of the yoke, a space key lever adapted to swing the pivot arm, and an adjustable stop mechanism for varying the amplitude of movement of the space key lever.

4. In a typewriting machine, the combination of a movable carriage, a plurality of type faces of varied widths according to the respective characters which they represent, a key operating mechanism for selectively transmitting type impulses to impulse receiving material, means comprising a friction clutch mechanism for imparting to the carriage positive advance movements, said mechanism comprising a ring gear in engagement with the carriage, a driving element operated by the key mechanism and positioned within the ring gear, and a holding element positioned within the ring gear and fixed to the machine, and means for returning the carriage to the initial operating position, said means comprising a gauge plate secured to a fixed part of the machine and formed with a slot, a carriage return stop and a carriage advance stop, a stop adjustably secured to the carriage, means for releasably holding said gauge plate, and means for releasing said holding means.

5. In a typewriting machine, the combination of a movable carriage, a carriage driving element, a carriage holding element, a one-way clutch comprising spring pressed rollers engaging between the driving element and the holding element, and word spacing means for imparting a series of advance movements of variable amplitude to said driving element.

6. In a typewriting machine, the combination of a movable carriage, a carriage driving element, a space key adapted to impart movements of variable amplitude to said driving element, and a clutch mechanism interposed between the driving element and the carriage and adapted to transmit movements of the driving element to the carriage, said clutch mechanism comprising a holding element and means interposed between the driving and holding elements to cause said elements to move together in one direction.

7. In a typewriting machine, the combination of a movable carriage, a carriage driving element, a carriage holding element, a one-way clutch comprising spring pressed rollers engaging between the driving element and the holding element, a casing enclosing the driving and holding elements, a one-way friction clutch between the holding element and casing adapted to prevent retrograde movements of said holding element, and means operatively connected with said driving element for imparting a series of positive advance movements of variable amplitude to said carriage to justify the line.

8. In a typewriting machine the combination of a movable carriage, a carriage driving element, a carriage holding element, a one-way clutch comprising spring pressed rollers engaging between the driving element and the holding element, a casing enclosing the driving and holding element, a one-way friction clutch between the holding element and casing adapted to prevent retrograde movement of said holding element, a plurality of type faces and their key operating mechanism, and means interposed between the keys and driving element for varying the movement of the driving element according to the key struck, and means for varying the spaces between words to any desired amount to justify the line.

9. In a typewriting machine, the combination of a movable carriage, a plurality of type faces, type face operating keys, a space key, a clutch mechanism for imparting to the carriage positive advance movements, means interposed between the type face operating key and the clutch mechanism for varying the movements of the clutch according to the type face operating key struck, and means interposed between the space key and the clutch mechanism for varying the effective movement of the space key to any desired amplitude.

10. In a typewriting machine, the combination of a movable carriage, a carriage driving element, a carriage holding element, a one-way clutch comprising wedging elements engaging between the driving element and the holding element, and word spacing means for imparting a series of advance movements of variable amplitude to said driving element.

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