

May 9, 1944.

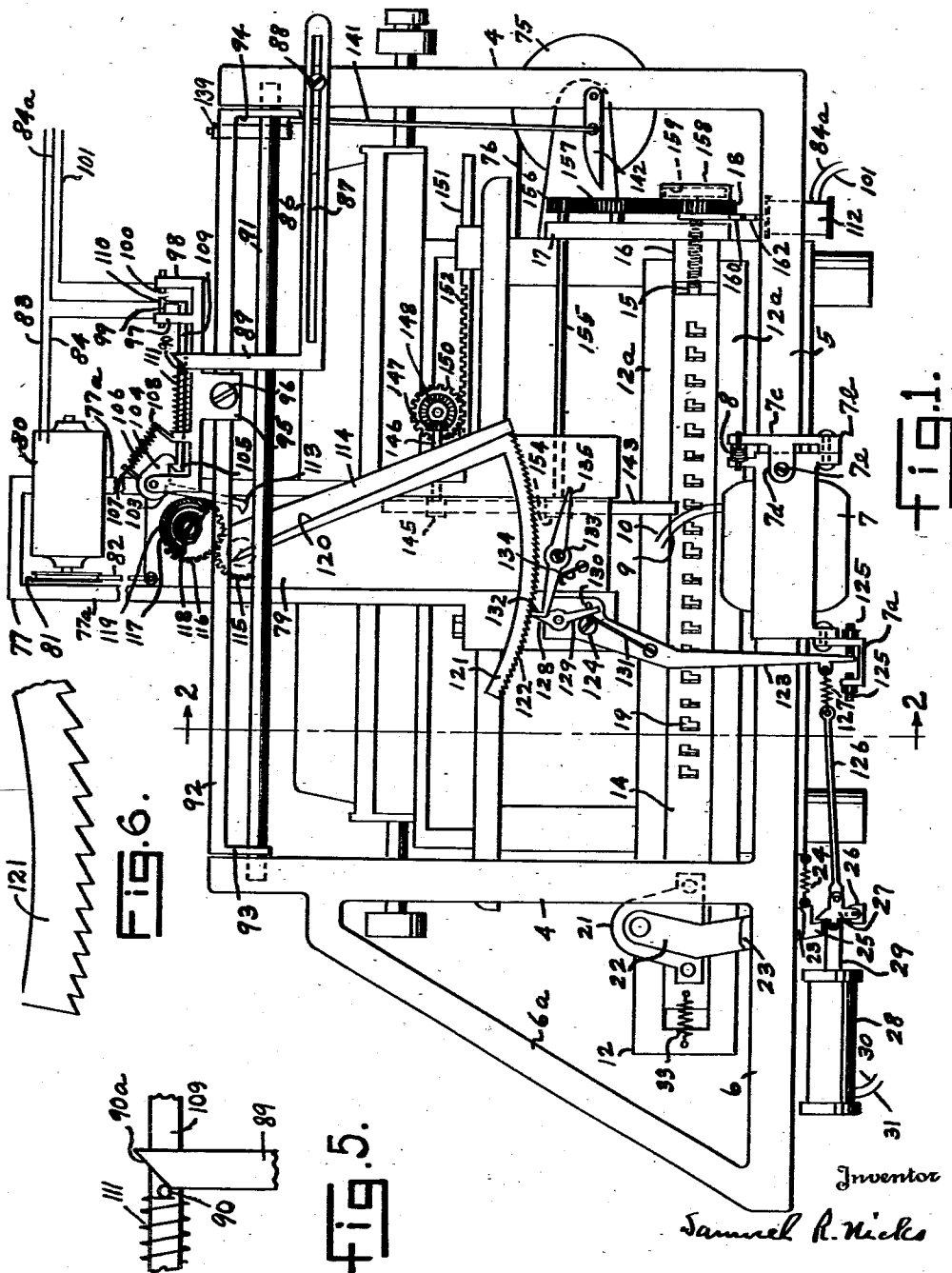
S. R. NICKS

2,348,261

LINE JUSTIFYING TYPING MACHINE

Filed Jan. 19, 1942

2 Sheets-Sheet 1



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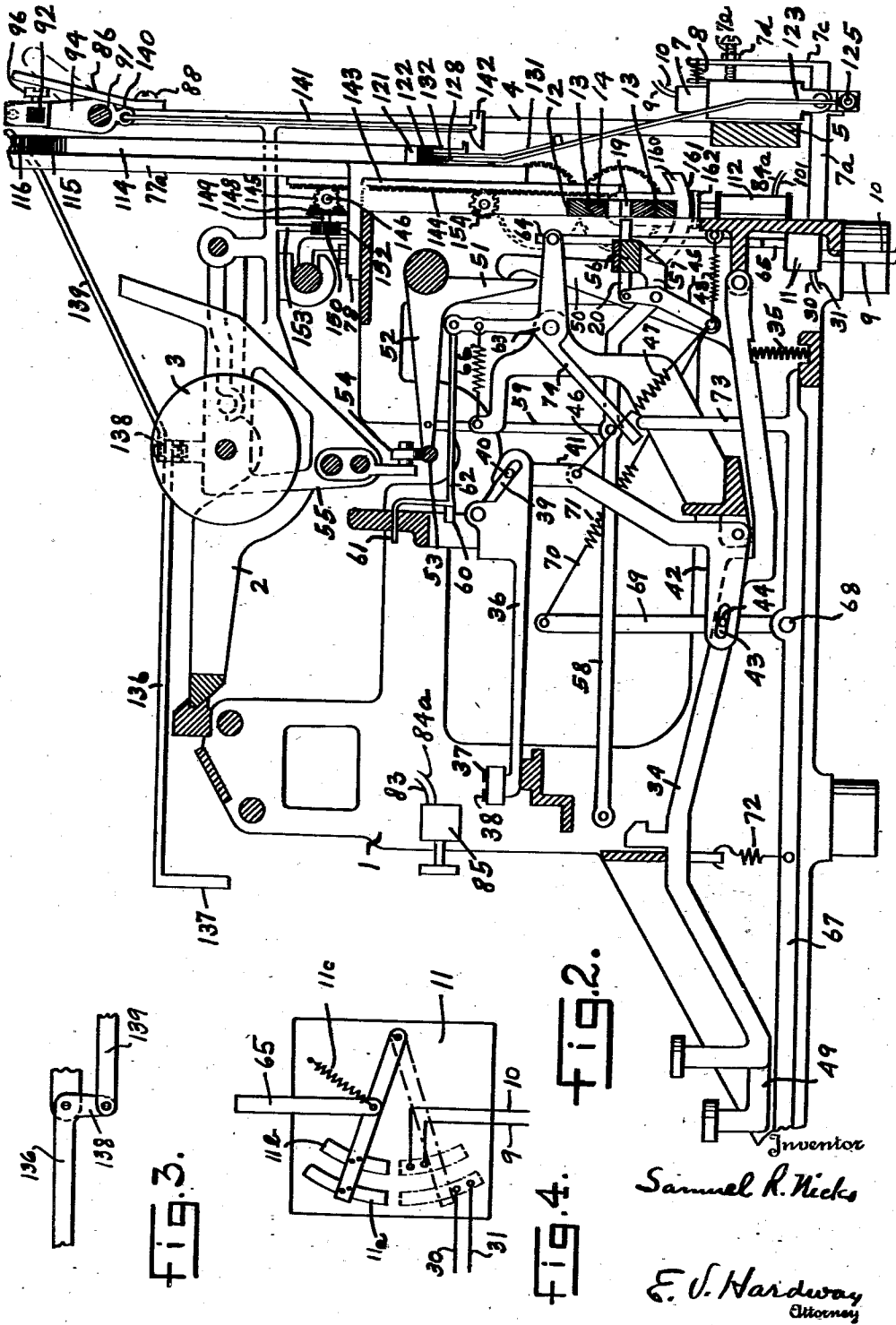
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2 Sheets-Sheet 2



UNITED STATES PATENT OFFICE

2,348,261

LINE JUSTIFYING TYPING MACHINE

Samuel R. Nicks, Houston, Tex.

Application January 19, 1942, Serial No. 427,242

5 Claims. (Cl. 197—84)

This invention relates to a line justifying typing machine.

An object of the invention is to provide a typing machine equipped with means whereby type written lines may be justified and delivered from the machine substantially of equal length.

In producing typewritten matter from the ordinary typing machine the length of the lines is not uniform, that is they do not terminate at the same line. The present invention embodies novel means for shortening the typewritten lines which extend beyond the desired length so that when the typewritten sheet is completed the work will be delivered from the machine with the typed lines of the same desired length.

While the invention is primarily intended for the purpose above stated, in the present disclosure it is illustrated for use in connection with a variable spacing type of typing machine such as is disclosed in United States Patent No. 2,188,252 issued to applicant on January 23, 1940.

With the above and other objects in view the invention has particular relation to certain novel features of construction, operation and arrangement of parts, an example of which is given in this specification and illustrated in the accompanying drawings, wherein:

Figure 1 shows a rear elevation of a typing machine showing the justifying attachment thereon.

Figure 2 shows a vertical sectional view taken on the line 2—2 of Figure 1.

Figure 3 shows a fragmentary, plan view.

Figure 4 shows a diagrammatic view of a switch mechanism employed,

Figure 5 shows a fragmentary, side elevation, and

Figure 6 shows an enlarged, fragmentary, side elevation of an arcuate toothed segment employed.

Referring now more particularly to the drawings wherein like numerals of reference designate the same parts in each of the figures, the numeral 1 designates the frame of a typewriter, or other typing machine, of any conventional construction.

This typing machine has the transversely movable carriage 2 of the usual construction which carries the cylindrical platen 3. Attached to the carriage and located at the rear of the typing machine there is a U-shaped frame comprising the vertical side bars 4, 4 connected at their lower ends by the brake bar 5. At one side the brake bar is extended beyond the corresponding side bar 4 forming a clutch bar 6 which is also supported

by the diagonal brace 6a connected at its lower end to the outer end of the clutch bar 6 and at its upper end to the corresponding side bar 4. A brake 7 is associated with the brake bar 5 and is of the electrical magnetic type. It is electrically connected with a suitable source of electrical energy through the wiring 9 and 10. It is pivotally mounted between the brackets 7a and 7b which are connected to the main frame of the typewriter as shown in Figure 2. The brake is mounted to pivot on a horizontal axis. The bracket 7b has an upstanding arm 7c which is provided with a laterally turned lug 7d. An adjusting screw 7e is threaded through said lug and forms a stop for limiting the range of outward movement of the brake. The brake is normally held against said stop and out of contact with the brake bar 5 by means of a pull spring 8 which is connected at one end to the upper end of the arm 7c and at its other end to the brake as clearly shown in Figures 1 and 2. When the brake is energized the pull of the spring 8 will be overcome and the brake will move into braking relation with brake bar 5. The brake bar 5 and the clutch bar 6 will then be held against movement. The electrical circuit through the wiring 9, 10 may be completed and broken through a conventional electrical switch 11d.

Secured to and extended transversely across the rear end of the framework 1 there is a U-shaped guide member 12 which is closed at one end, as shown in Figure 1, and which has the confronting grooves 13, 13 forming guides or tracks for the spacing bar 14 whose margins are shaped to fit into said grooves. This spacing bar is movable transversely, its range of movement being limited in one direction by an adjustable stop 15. A guide 16 is fitted between the corresponding ends of the side bars 12a, 12a of the guide member 12, said guide 16 being rigidly secured to the part 17 of the main frame 1. The stop 15 is threaded through the part 17 and the guide 16 and has a spur gear 18 secured on the outer end thereof.

The spacing bar 14 has a series of openings 19 therethrough, through which the dogs 20 of a corresponding series may be projected.

Upstanding from the spacing bar 14, and preferably at the outer end thereof, there is a bracket 21 and pivotally connected, at one end, to the upper end of said bracket there is a depending clutch lever 22. The lower end of this clutch lever has the spaced upper and lower clutch jaws 23, 23 which are spaced a sufficient dis-

tance apart to receive the clutch bar 6 between them. The lower end of the clutch lever is connected to the main frame 1 by means of a pull spring 24. Normally this spring holds the clutch lever 22 in angular relation to the bar 6 so as to cause said jaws 23, 23 to grip the upper and lower margins of the bar 6 so as to hold the said bar against movement.

The lower end of the clutch lever 22 terminates in a depending shoulder 25 and pivoted to a bracket 26, which may be suitably connected to the main frame, there is a dog 27 whose upper end is engageable with said shoulder. There is an electro-magnet 28 whose core is pivotably connected to the dog 27 by means of a link 29. The electro-magnet 28 is electrically connected with a suitable source of electrical energy through the wiring 30, 31 and the electrical circuit may be completed or broken through the electrical switch 11b. When the electro-magnet 28 is energized the dog 27 will be engaged with the shoulder 25 and the clutch lever 22 will be correspondingly moved so as to cause the gripping surface of the jaws 23, 23 to move into parallel relation with the margins of the bar 6 whereby said bar will be released from the gripping action of said jaws.

Upon release of the jaws, the pull spring 33, attached at one end to the closed end of the guide member 12 and at its other end to the bar 14, will cause a movement of said bar, the range of said movement being limited by one of the dogs 20 as hereinafter explained.

It may be here noted that there is a spacing dog 20 and a corresponding spacing opening 19 in the bar 17 for each type lever and one for the spacing lever.

The numeral 34 designates a conventional key lever which is pivoted, at its inner end, to the frame and which is normally held elevated by the compression spring 35. Corresponding with each key lever there is the conventional type bar 36 pivoted to the main frame and whose forward, or free, end is provided with the lower and upper case type 37, 38. The other end of the type bar has the diagonal slot 39 forming a bearing for the pin 40 which extends out laterally into said slot from the upper end of the type bar link 41 which is pivoted at its lower end on the frame and has the forwardly extended arm 42 which is provided with an oblong slot 43 to receive the stud 44 extending out laterally from the corresponding key lever 34. Upon depression of the key lever the upper end of the type bar link 41 will be thrown forwardly and the free end of the type bar 36 will be actuated upwardly to carry the type into printing relation with the platen 3 in the conventional manner.

The inner end of each spacing dog 20 is pivotably connected to the upper end of the actuating lever 45 and the lower end of this lever is connected to the type bar link 41 by means of the tie 46 which includes a coil spring 47. Accordingly, upon actuation of the type bar link 41 the corresponding dog 20 will be projected through its aligned opening 19. Upon release of the key lever 34 the spring 35 will elevate it to its original position thus releasing the tension on the spring 47. Thereupon the pull spring 48 will operate through the lever 45 to retract the corresponding dog 20. This pull spring 48 is attached at one end to the main frame 1 and at its other end to the free end of the lever 45.

The dogs 20 operate through the openings 19 in the guide bar 17 as hereinabove explained, and

the dogs 20 may be shifted vertically in said openings for a purpose to be hereinafter explained, as the shift lever 49 is manipulated to shift from lower case to upper case letters. This shifting is accomplished in the conventional manner. The inner end of the shift lever is pivoted on the main frame in the same manner as the key lever 44. The pivoted end of the shift lever 49 has an upstanding finger 50 whose upper end is forwardly curved and rides against the bearing face 51 of the depending arm of the bell crank 52. There are two of these bell cranks, one at each side of the machine and the free ends of whose horizontally extended arms support a transverse rod 53 which forms a track on which the roller 54 runs in the conventional manner. The conventional platen support is designated generally by the numeral 55 and the roller 54 is carried by this platen support. Upon actuation of the shift lever 49 the finger 50 will be actuated forwardly on the track 53, and the platen support, and the platen will be elevated. When the platen is in lower position the lower case letters 37 cooperate therewith and when elevated the upper case letters 38 co-operate therewith in the well known manner.

The dogs 20 are mounted in a magazine 56. This magazine has the forwardly directed brackets 57 on which the respective levers 45 are pivoted and the ends of the magazine 56 are supported on the lift levers 58, one at each side of the machine. The forward ends of the lift levers are pivoted to the framework 1 and these levers are connected to the horizontal arms of the bell cranks 52 by the lift lever rods 59. Accordingly, upon the actuation of the shift lever 49 the lift levers 58 and the magazine 56, with the series of dogs 20 therein, will be elevated to upper position. The dogs 20 work through suitable bearings in the magazine.

Upon actuation of a key lever 34, the corresponding type bar 36 will be operated as explained and upon operation of any type bar it will strike the transverse thrust bar 60. This thrust bar is supported by an upstanding guide 61 whose upper end is forwardly turned and extended through a bearing in the framework of the machine as shown in Figure 2. Extending rearwardly from the thrust bar 60 is a thrust rod 62 whose rear end is pivoted to the free end of the upstanding arm of the bell crank 63. The other arm of said bell crank has a pivoted connection with a vertically movable switch—actuating rod 64. The lower end of this rod 64 is aligned above the push rod 65 of the switch 11b. When a type bar is actuated as above stated there will be a rearward thrust imparted to the bar 62 and a downward thrust to the rod 64 actuating the switch 11b. Upon release of the key lever the bell crank 63 will be moved to original position by the pull spring 66, one end of which is attached to the upstanding arm of said bell crank and the other end of which is attached to a stationary part of the framework. Upon this actuation of the switch 11b a circuit through the wiring 9, 10 will be completed and the electric brake 7 hereinabove referred to will be rendered active to hold the brake and clutch bars 5, 6 and the carriage of the machine stationary.

Upon downward movement of the rod 64 the switch 11a is also actuated to complete a circuit through the wiring 30, 31 and the electro-magnet 28 thus energized and the dog 27 is thus actuated against the shoulder 25 to release the clutch from

the clutch bar 6 thus permitting the spacing bar 14 to move, under the influence of the spring 33, to the left as indicated in Figure 1, and upon release of the key lever and the subsequent upward movement of the rod 64, under the influence of the spring 66, the switch 11a will be actuated by the spring 11c to break the circuit 30, 31 and electro-magnet 28 will be de-energized and the spring 24 will thereupon operate to again apply the clutch to the bar 6. The switch 11b will immediately thereafter, also, break the circuit through the wiring 9, 10 and release the brake, allowing the carriage to move. The switches 11a, 11b are mounted on a pivoted lever 11c formed of insulating material to which the rod 64 is connected and housed in the casing 11.

The numeral 67 designates a space bar lever. In the conventional type of typing machine there are two of these levers one on each side and connected at their forward ends by the conventional spacing bar. At an intermediate point each space bar lever is pivoted on a transverse rod 68 and upstanding from one of said levers 67 there is an arm 69. The free end of this arm is connected to the free end of the corresponding actuating lever 45 by means of a tie 70 which includes a coil spring 71 so that upon actuation of the space bar 67 the dog 20 corresponding to said bar will be projected through its aligned opening 19. The forward ends of the space bar levers 67 are normally held elevated by the coil spring 72 which is connected at one end to one of said levers and at its other end to the framework above. The inner end of one of the space bar levers 67 carries an upstanding finger 73 aligned underneath the free end of the forwardly projecting arm 74 of the bell crank 63. When the space bar 67 is depressed the finger 73 will elevate the arm 74 moving the rod 64 downwardly, actuating the switch 11b as before and setting the electric brake to hold the brake bar 5 and the clutch bar 6 against movement and releasing the mechanical clutch jaws 23, 23 to permit retraction of the spacing bar 14 under the influence of the spring 33 as hereinabove explained thus controlling the spacing between the typed words or characters. Upon release of the space bar 67 it will be elevated by the spring 72 thus releasing the corresponding dog actuating lever 45 and permitting the corresponding spacing dog 20 to be retracted by the corresponding pull spring 48.

The carriage 2 is moved by the conventional means for that purpose. As shown in Figure 1 there is an involute spring housed within the housing 75 with its free end 76 attached to the carriage, for intermittently moving the carriage.

As also clearly illustrated, in Figure 1, the openings 19 vary in width and likewise the dogs 20 which work through said openings 19 are widened laterally as shown in Figure 1 and for a purpose to be hereinafter explained.

The faces of various letters and characters used in printing and of the regular printing type vary in width over a wide range from the narrowest of lower case letters to the widest of upper case letters. However, in the ordinary typing machine the spacing for the letters and characters used is the same. In order to adapt a typing machine, however, for use in lithography or offset printing it is necessary to provide for variable spacing, rather than the uniform spacing so that spacing for each letter, or character, will vary in accordance with the width thereof; and this should be done automatically. By the use of the variable spacing typing machine herein described

this automatic variable spacing may be accomplished, that is, the carriage is automatically released and permitted to move only the required space for each individual letter or character as it is printed on the work. The movement of the carriage, that is, the spacing, takes place immediately after the letter, or character, is imprinted on the work and the spacing mechanism is such that the carriage is permitted to move the exact space or width of the letter or character immediately after such letter or character is imprinted on the work. In order to more clearly disclose this feature the operation of the variable spacing attachment of the typing machine will be briefly stated as follows:

Upon depression of the key lever 34, the dog 20, corresponding to said lever will be projected rearwardly through its opening 19, the key bar 36 will be actuated to cause a lower case letter 37 to come into contact with the work and print the letter or character thereon. At the same time the switch 11 will be actuated and the electric brake rendered operative to hold the brake bar 5, and the clutch bar 6, and the carriage against movement. The clutch lever 22 will also be operated to release the clutch jaws 23, 23 from the clutch bar 6 thus releasing the spacing bar 14 to the pull of the spring 33. The bar 14 will then move a distance depending on the relative width of the opening and the dog which has been projected through said opening. The relative width of said dog and opening should correspond to the width of the letter or character just impressed or printed on the work. Upon release of the key lever the switches 11b, 11a will be actuated releasing the electric brake, breaking the circuit through the wiring 30, 31 to de-energize the magnet 28 thus permitting the spring 24 to cause the clutch jaws 23, 23 to re-engage the clutch bar 6. The carriage, clutch bar 6, and spacing bar 14 are now clutched together and can move only a distance equal to the width of the letter or character last impressed on the work, whereupon the spacing bar 14 will engage the stop 15. Each dog 20 and its corresponding opening 19 are of such relative width as to allow the carriage to move only a distance corresponding to the width of the letter or character last imprinted on the work.

When the upper case letters are to be used the shift lever 49 may be depressed thus elevating the platen and at the same time correspondingly elevating the magazine 56 so as to carry the dogs 20 into alignment with the widened portion of the openings 19 and thereupon, upon the operation of the key lever, the corresponding key bar 36 will be actuated as hereinabove explained bringing the upper case letters, or characters, into printing relation with the work. The corresponding dog 20 will be projected through its opening 19 opposite the widened portion thereof so as to allow a greater range of movement of the spacing bar 14, the said widened portion varying in width in accordance with the variations in width of the corresponding upper case letters. Otherwise the operation of the machine is the same as it is in the case of the lower case letters.

The line justifying attachment will now be described.

Secured to, and upstanding from the frame 1, there is an inverted U-shaped track 77 having the vertical side bars 77a, 77a. This frame is attached to the main frame of the machine by suitable brackets 78.

Vertically movable in said track there is a

plate-like carrier 79. Secured to the upper end of the frame 77 there is an electric motor 80 having a pulley 81 fixed to the shaft thereof. A flexible belt 82 has one end attached to the upper end of the carrier 79 and its other end is wound on the pulley whereby upon rotation of the pulley in one direction the carrier will be elevated. Electrical wiring 83, 84, 84a leads to the motor from a suitable source of electrical energy and is equipped with a manually operable switch 85 accessible to the operator.

Secured to one of the side bars 4 there is a transverse adjustable bar 86 having an elongated longitudinal slot 87 to receive the set screw 88 which is fitted through the slot 87 and is screwed into the corresponding side bars 4 and whose head clamps against the bar 86 to secure it at any selected point of adjustment. The inner end of the bar 86 has an upstanding arm 89 whose upper end is provided with a beveled guide face 90a.

There is a transverse rod 91 whose ends have bearings in the upper ends of the side bars 4, 4 as shown in Figure 1. Spaced above the rod 91 there is a transverse bar 92 preferably square in cross-section whose ends have the downwardly turned arms 93, 94 which have bearings on the rod 91 as shown in Figures 1 and 2. There is a bracket 95 which has a bearing therethrough to receive the bar 92 and which may be secured in a selected position on said bar by the set screw 96. This bracket is elongated as shown in Figure 1 and, at one end, has the upstanding supports 97, 98, the former of which carries the electric contact 99 connected with the wiring 84 and the latter of which carries the electrical contact 100, which is connected with the electrical wiring 101. Upstanding from the other end of the bracket 95 there is a bearing member 102 and a standard 103. A dog 104 is pivotally mounted on the standard 103 and is normally held in engagement with a pawl 105 by means of a pull spring 106 which is attached at one end to an arm 107 upstanding from said dog and at its other end to an anchor 108 upstanding from the bearing 102. The pawl 105 has an extended shank 109 which works through the bearings 102 and which carries a contact point 110 engageable with either of the contact points 99 or 100. When the dog 104 is engaged with the pawl 105, the contact points 99 and 110 are in contact and when the switch 85 is closed a circuit will be completed through the motor 80. When the dog 104 is released from the pawl 105, a coil push spring 111, around the shank 109, will operate against a pin 90 outstanding from the shank 109, to move the contact point 110 into contact with the contact point 100 and said circuit to the motor will be broken and a circuit will be completed through the wiring 84a and 101 through the electro-magnet 112.

The dog 104 has a depending release arm 113 for a purpose to be hereinafter explained.

There is a lever 114 whose upper end is pivotally mounted on the carrier 79 and is provided with an arcuate rack member 115 which is in mesh with the corresponding arcuate rack member 116 on a cylindrical housing 117. This housing is mounted to rotate about a central pivot pin 118 which is attached to the carrier 79. An involute spring 119 is attached at one end to the pin 118 and at its other end to the housing 117 and is arranged to be placed under tension as the lever 114 is moved to the right, as illustrated in Figure 1, by the corresponding turning movement of said housing 117.

The lever 114 is provided, on one side, with a

longitudinal bearing face 120 arranged, under the conditions hereinafter explained, to engage the arm 113 and release the dog 104 from the pawl 105 to cause the stopping of the motor 80 and the energizing of the electro-magnet 112.

The lower end of the lever 114 has a retracted, arcuate segment 121 having a ratchet face from end to end thereof formed with ratchet teeth 122. As shown in Figure 3, these teeth decrease in size toward the free end of the segment for a reason to be hereinafter stated.

There is a lever 123 which is pivoted on the lower end of one of the side bars 70a by means of the pin 124. The lower end of this lever works between the adjustable stops 125, 125 carried by the bracket 7a. A link 126 is pivotally connected at one end to the dog 27 and its other end is connected, by means of the coil spring 127, to the lower end of the lever 123. Pivotally mounted on the extended upper end of the lever 123, above the pin 124, there is a dog 128 engageable with the teeth 122. This dog has a downwardly extended arm 129 which is located between an outwardly extended pin 130, extending out from the lever 123, and a flat pressure spring 131 one end of which is anchored to said lever 123 and whose other end presses against the arm 120 opposite the pin 130. When the electro-magnet 28 is energized, a pull is exerted through the link 126, correspondingly actuating the lower end of the lever 123 and causing the dog 128, which is in engagement with a tooth 122, to actuate the segment 121 and lever 114 to the right. When the electro-magnet 28 is deenergized as hereinabove explained, the spring 24 will move the lever 22 to the right, the shoulder engaging the dog 27 and moving it correspondingly together with the link 126 thus allowing the lever 123 to move back to original position. The upper end of said lever, carrying the dog 128, will move in the opposite direction releasing said dog 128 from the tooth 122 with which it is engaged and the spring 131 causing said dog to engage behind the next succeeding tooth 122. Upon release of the dog 128, the segment 121 will be held by the pawl 132 which is pivoted on the carrier 79 by means of the pin 133 and which is held yieldingly in engagement with the teeth 122 by the pressure spring 134 which is also anchored on said carrier. The pawl 132 has an extended release arm 135 which is provided for a purpose to be hereinafter stated.

Accordingly, while typing a line the lever 114 will be intermittently moved to the right. As shown in Figure 1, this lever is in the position it will occupy at, or approximately at, the completion of a typewritten line before the latter has been justified. It may be here stated that by the use of the present invention as illustrated, the line will first be typed and the carriage then shifted and the line will be re-typed and if there is an overrun, that is, if the line as originally typed is longer than the selected length, when it is re-typed it will have been justified or shrunk up to the length of line desired.

The width of the column to be typed will be determined by the position of the bracket 95 and its appendants on the bar 92. This bracket 95 may be adjusted by loosening the set screw 96 and making the adjustment and then again tightening up said set screw. In making this adjustment the bar 86 should also be adjusted correspondingly which may be done by loosening the set screw 88 and making the adjustment and then tightening said set screw.

When the end of a line has been reached the

carriage is reversed for the beginning of a new line. There is a return lever 136 one end of which is pivotally connected to the carriage and whose forward end has a downwardly turned grip 137. This is the usual construction now employed on conventional typing machines. The pivoted end of the return lever 136 carries an overturned arm 138 to the free end of which one end of the push rod 139 is pivoted and the other end of this push rod is pivotally connected to the transverse bar 92. Accordingly, when the lever 136 is actuated to return the carriage the bar 92 will be swung, on its arms 93, 94, rearwardly and the pin 90 projecting out from the shank 109 will strike the beveled face 90a of the upstanding arm 89 thus moving said shank 109 to the left so as to cause the re-engagement of the pawl 105 with the dog 104, placing the spring 111 under compression and bring the contact point 110 into contact with the contact point 99; also the bracket 95 and its appendants will be swung clear of the bearing face 120 of the lever 114 thus permitting said bracket and appendants to move with the carriage to starting position without the release arm 113 coming into contact with the face 120.

The arm 94 has a depending eye 140 to which the upper end of the lift rod 141 is connected. The lower end of this lift rod is pivotally connected to a release lever 142 which is pivoted at one end to the adjacent side bar 4 and whose other end is extended inwardly and beveled downwardly as shown in Figure 1. When the carriage is reversed, that is, when it is moved to starting position the release lever 142 will engage underneath the free end of the release lever 135 thus disengaging the pawl 132 from the teeth of the segment 121 and thereupon the spring 119 will rotate the housing 117 which in turn will effect the return of the lever 114 to vertical, or starting position.

Fastened on the forward side of the carrier 79 there is a rack bar 143 whose forward face is provided with gear teeth 144. This rack is in mesh with a spur gear 145 which is fixed on one end of the shaft 146 mounted in suitable bearings on the main frame. Fixed on the other end of this shaft there is a bevel pinion 147 which is in mesh with a bevel gear wheel 148 which is fixed on the shaft 149. Fixed on this shaft 149 there is a spur gear wheel 150 which is in mesh with the transversely movable rack member 151 whose upper side is formed with gear teeth 152 to mesh with the spur gear 150. The carriage is provided with a depending arm 153 which is aligned with the outer end of the bar 151 and upon return of the carriage to original or starting position, the arm 153 contacts against the outer end of the rack member 151 and causes the same to move toward the left operating through the gearing 150, 148, 147 and 145 to move the carrier 79 downwardly to its original position.

There is also a spur gear 154 which is fixed on one end of the transverse shaft 155 and which is in mesh with the rack teeth 144. Fixed on the other end of the shaft 155 is a spur gear 156 which is in mesh with an intermediate spur gear 157 mounted to rotate on the main frame of the typewriter and this intermediate gear is in mesh with the spur gear 18. Fastened to the outer face of the spur gear 18 there is a circular housing 158 which contains an involute spring 159 one end of which is attached to the housing 158 and the other end of which is attached to a stationary anchor. This involute spring is under tension which is transmitted to the gear 18 and which tends to turn said gear 18 in a direction the opposite of the ro-

tation imparted to it by the intermediate gear 157 so that the teeth of said gears will be held in close contact and there will be no lost motion between them. Upon upward movement of the carrier 79 the rack member 143 will rotate the spur gear 154 and the shaft 155 and rotation will be imparted through the gear 156, 157 to the spur gear 18 and the stop 15 will be screwed inwardly. The distance the stop 15 is screwed inwardly will depend upon the distance the carrier 79 moves upwardly and this in turn will be determined by the time of contact of the bearing face 120 with the release arm 113 which effects the release of the dog 104 from the pawl 105 and the stopping of the motor 80.

In use a sheet of paper will be inserted into the typewriter in the usual way and the carriage of the machine will be moved to the left, that is to starting position, and the lever 114 will be moved, as hereinabove explained, to neutral, or vertical position. The width of the column of printed matter will be determined by the position of the bracket 95 on the bar 92. As the carriage is moved to starting position the carrier 79 will be moved to its lower position, as shown in Figure 1, and as it is moved to its lower position the gearing 156, 157 will rotate the gear 18 to withdraw the stop 15 so that the spacing bar 14 will be allowed its maximum range of movement. It is to be understood that the typewritten matter will be written in two columns. Each line as written in the first column will be repeated in the second column. The lines of the typewritten matter in the first column will be of variable lengths while the lines of typewritten matter repeated in the second column will be justified or of the same, or selected length. As a line in the first column is written the carriage will be to the left as the machine is viewed in Figure 1. As each key is struck the lever 114 will be moved a distance equal to the length of the corresponding tooth 122 with which the dog 128 is engaged so that as the typing of the line progresses, the lever 114 will be intermittently moved to the right as viewed in Figure 1. When a line in the first column is completed the switch 85 will be closed by the operator and the motor 80 started and the carrier 79 elevated. If the line as typewritten overruns the selected length, the release arm 113 will have passed the upper end of the bearing face 120, the distance it may have moved beyond said face depending on the amount of overrun, that is the number of letters typed beyond the desired length of the line. Consequently, the amount of upward movement of the carrier 79 before the face 120 strikes the release arm 113, and releases the dog 104, will depend on the overrun of the typewritten line. As the carrier 79 moves upwardly the stop 15 will move inwardly to shorten up the range of movement of the spacing bar 14 and this inward movement of the stop 15 will be immediately stopped upon release of said dog 104 and the consequent stopping of the motor 80.

The teeth on the rack 121 are graduated down from right to left, as illustrated in Figure 6, by a certain mathematical progression, being coarsest or further apart at the extreme right and graduating downward to the left at that certain rate of progression required to make the angle of the face 120 an accurate gauge of the run-over divided by the number of key strokes (that is letters and spaces) required to make the line.

For example: in a line with half-inch run-over beyond the length of line to be set or typed in its justified length, and with fifty strokes, the travel upward of the plate 79 carrying carriage

lever face 120 will be exactly the distance to turn screw 15 or space bar stop to a set up of .0010", which is the accurate space to be deducted from each stroke, or each movement of the platen to shrink the line to a length one-half inch shorter.

For a line with the same runover but with one hundred strokes, the face 120 could only move one-half the distance of the movement in the fifty stroke line before the surface of the gauge face 120 came into contact with the pawl 113 and cut off the motor and stopped the movement upward of the stop 15. This would be a set up of .0005" on the space bar stop screw 15, shortening the space of each of the one hundred strokes by that much, which would be a total of one-half inch the line was shortened.

Thus the angle of the gauge lever face 120 changes with each stroke on the keyboard, and the teeth 122 on the bar 121 being cut with mathematical precision for each stroke angle, decreasing with the proper progression so that at any given number of strokes the angle of the gauge face 120 is always in the accurate position at the end of any typed line so that when pulled up by the motor will contact the release arm 113 at just the right travel to turn the space bar stop 15 to a set-up of the overrun space divided by the number of strokes.

Brake means have been provided for immediately stopping the rotation of the gear 18 when the motor 80 is stopped so that there will be no additional movement due to the momentum of the parts. This brake means comprises a brake shoe 160 having an arcuate braking surface 161 and attached to the core of the electro-magnet 112 there is a friction block 162 adapted to frictionally engage the surface 161. Upon release of the dog 104 from the pawl 105 and the stopping of the motor 80 as hereinabove explained, the contact point 110 will move into contact with the contact point 100 and a circuit will be completed to the electro-magnet 112 through the wiring 84a 101 and said electro-magnet will be energized actuating the friction block into braking engagement with the friction surface 161 and the movement of the gear 18 will be immediately stopped. The line will then be re-typed in the second column and the re-typed line will be shortened up or justified by reason of the fact that the range of movement of the spacing bar 14 has been limited so as to take up the amount of said overrun, that is, the excess length of the first typewritten line over that desired.

The carriage is then reversed or moved to starting position, as hereinabove explained, and the next line is typed in the first column and then re-typed in the second column as before. Said re-typed lines being justified in the manner stated.

What I claim is:

1. A typing machine comprising a frame, a work holding carriage movable on the frame, a plurality of printing type of varying widths, means for selectively actuating the type into printing relation with the work on the carriage to form a printed line, a movable spacing bar, a clutch for connecting the movable spacing bar with the carriage, a clutch on the frame operable to hold the carriage against movement, means for controlling the range of movement of the spacing bar, means arranged to be rendered operative by the operation of the line printing mechanism and under the control of the operator and effective to actuate said range controlling means whereby the latter will be automatically adjust-

ed in accordance with the overrun of the printed line and the number of characters in the line to control the range of movement of the bar to cause the line to be justified when it is re-typed.

2. A typing machine comprising a frame, a work holding carriage movable on the frame, a plurality of printing type of varying widths, means for selectively actuating the type into printing relation with the work on the carriage to type a line on the work, means for moving the carriage, means for releasing the carriage to said moving means upon actuation of the type, a movable spacing bar arranged to be engaged with the carriage, means for moving said bar, clutch means on the bar for temporarily holding it against movement, means controlled by the type actuating means and movable to active position, upon actuation of a type, to engage the spacing bar and limit the range of the carriage movements, an electrically operable holder controlled by the type actuating means and effective to temporarily hold the carriage stationary while the range limiting means are moved to active position, means to thereafter engage the clutch to effect the subsequent, simultaneous movement, of the carriage and spacing bar, means arranged to be set by the line typing mechanism and under the control of the operator and means arranged to be actuated by said last mentioned means and effective, when actuated, to be automatically adjusted to control the range of movement of the spacing bar in accordance with the overrun of the typed line and the number of characters in the line whereby the line will be justified when it is re-typed.

3. A typing machine comprising a frame, a work holding carriage movable on the frame, a plurality of printing type, means for selectively actuating the type into printing relation with the work on the carriage to type a line on the work, means for moving the carriage, means for releasing the carriage to said moving means upon actuation of the type, a movable spacing bar adapted to be clutched with the carriage, means for moving said bar, clutch means on the bar whereby the bar may be clutched with the carriage, means controlled by the type actuating means and movable into active position, upon actuation of the type, to engage the spacing bar and to limit the range of carriage movement, a holder controlled by the type actuating means and effective to temporarily hold the carriage stationary while the range limiting means are moved to active position, means to thereafter cause the engagement of the clutch to effect the subsequent simultaneous movement of the carriage and spacing bar, means arranged to be automatically operated to control the range of movement of the spacing bar in accordance with the overrun of the typed line and the number of the characters in the line and means arranged to be set during the typing of the line and under the control of the operator for rendering the automatically operable means operative whereby the line will be justified when it is re-typed.

4. A typing machine comprising a frame and a carriage, a plurality of printing type, means for selectively actuating the type into printing relation with the work on the carriage, a movable dog connected to and actuated by each of the type actuating means, a movable spacing bar, means for moving said bar, a clutch for engagement of the bar to the carriage, a holder associated with the carriage, each of said dogs, when actuated by the type actuating means, being

arranged to engage with the spacing bar and allow only a limited movement of the carriage, means to operate the holder before and the clutch after movement of the spacing bar, means arranged to be automatically operated to vary the range of movement of the spacing bar in accordance with the overrun of the typed line and the number of characters in the line, means arranged to be set by the line typing mechanism and controllable by the operator to actuate the range varying means whereby the line will be justified when it is re-typed.

5. A typing machine comprising a frame, a transversely movable work holding carriage on the frame, a plurality of printing type, means for selectively actuating the type into printing relation with the work on the carriage to form a printed line, a movable spacing bar, a dog con-

5 nected to and arranged to be actuated by each of the type actuating means, means for moving said bar, a clutch for clutching the bar with the carriage, a holder associated with the carriage, each of said dogs, when actuated by the type actuating means, being arranged to engage with the spacing bar and allow only a limited movement of the carriage, means to operate the holder before and the clutch after the movement of the spacing bar, means for controlling the range of movement of the spacing bar in accordance with the overrun of the typed line, means arranged to be set by the line typing mechanism and controllable by the operator to actuate the range varying means whereby said line will be justified when re-typed.

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