

Dec. 3, 1929.

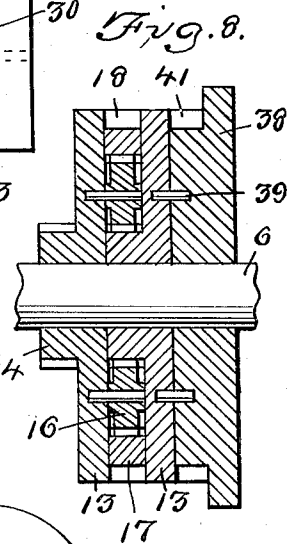
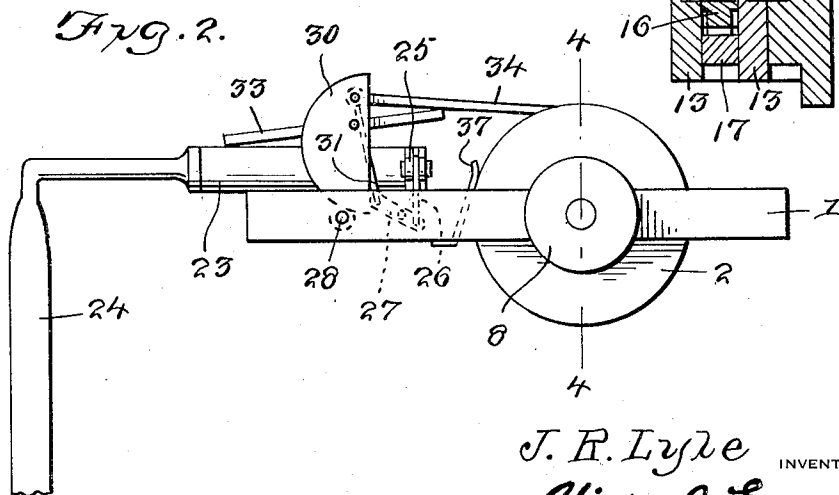
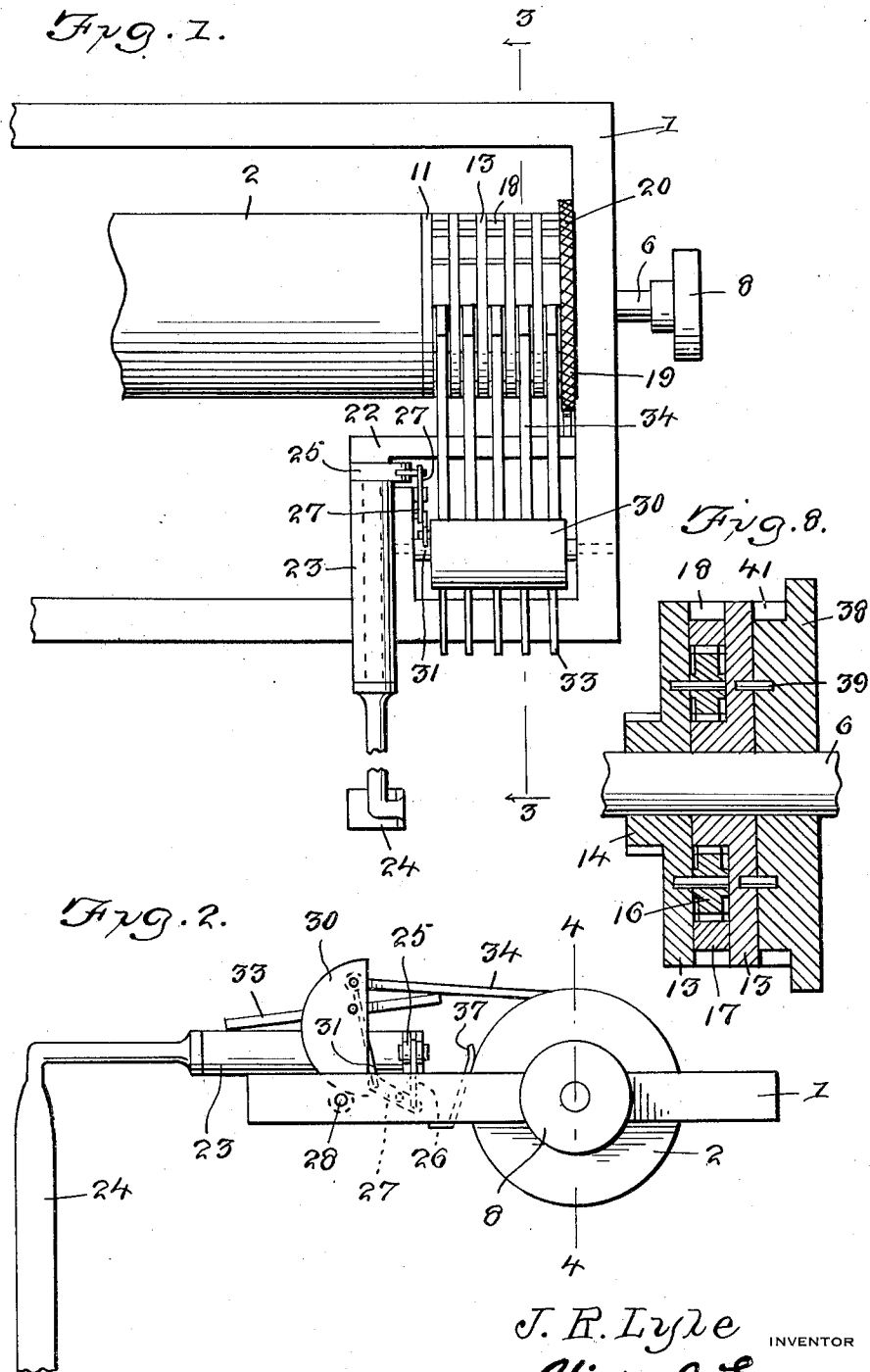
J. R. LYLE

1,737,801

VARIABLE LINE SPACING DEVICE

Filed Aug. 6, 1928

2 Sheets-Sheet 1



J. R. Lyle INVENTOR
BY *Victor J. Evans* ATTORNEY

Dec. 3, 1929.

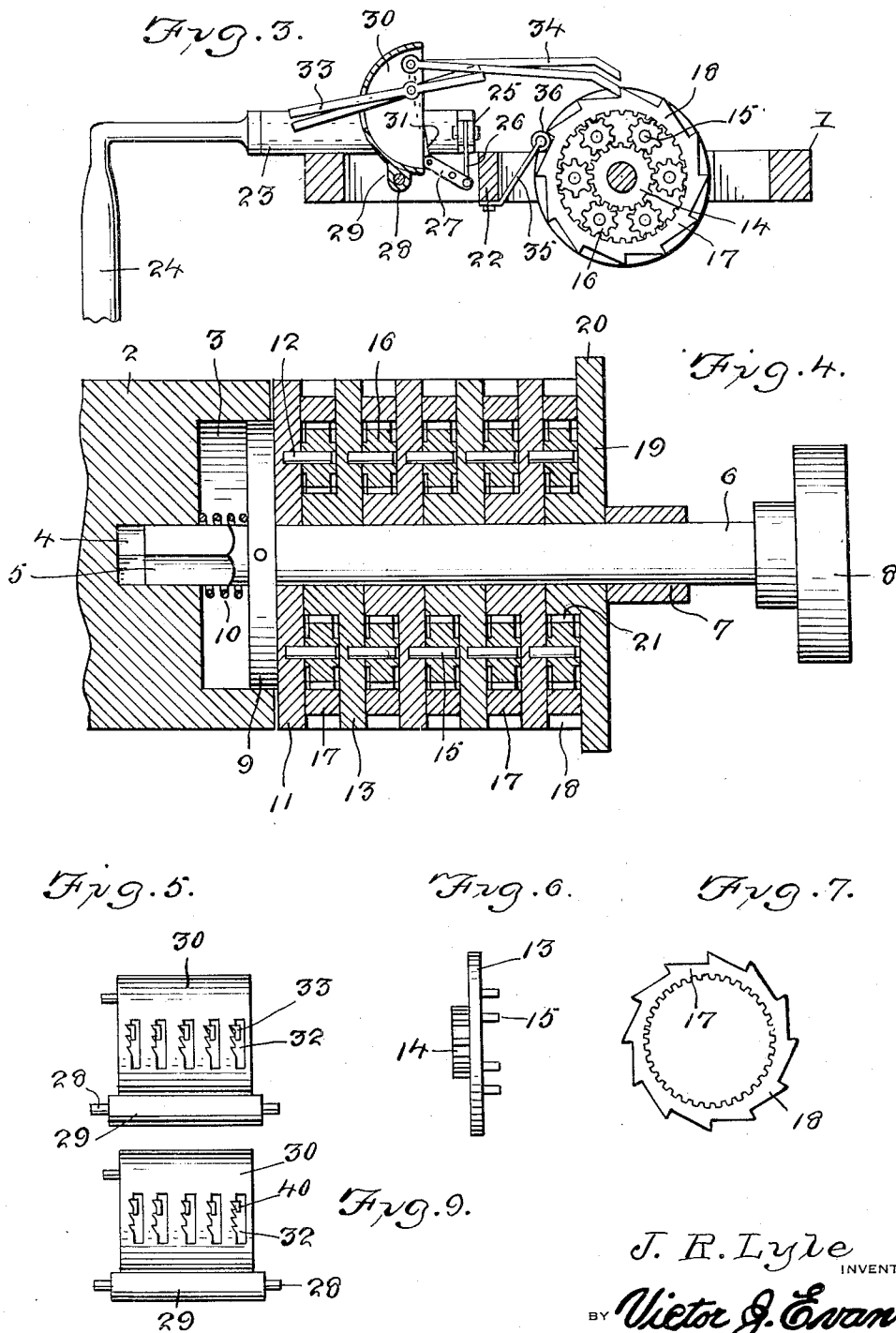
J. R. LYLE

1,737,801

VARIABLE LINE SPACING DEVICE

Filed Aug. 6, 1928

2 Sheets-Sheet 2



J. R. Lyle
INVENTOR
BY Victor J. Evans
ATTORNEY

UNITED STATES PATENT OFFICE

JOHN R. LYLE, OF LEBANON, KENTUCKY

VARIABLE-LINE-SPACING DEVICE

Application filed August 6, 1928. Serial No. 297,757.

This invention relates to attachments for typewriters, and its general object is to provide a device for regulating the line spacing movements of the platen of a typewriter whereby these movements may be varied from a minute fraction of an inch and upward, to provide spaces of a multiplicity of widths within certain limitations with the result spaces of any desired widths may be provided to meet existing writing conditions.

A further object of the invention is to provide a variable line spacing device for typewriters, that is adapted to replace the usual single, double and triple lines spacing means now in general use on typewriters of various makes by a line spacing device that is capable of providing spaces of a width less than the width of the space formed by the usual device when the latter is set for single spacing, and also spaces that are wider than the width of the usual single space, with the result the device has many advantages over the spacing means now generally employed, and is especially useful in writing on ruled forms and the like, as when the device is once adjusted to the ruled lines of the form, the spaces are retained in accordance with the lines, therefore the operator can proceed without further attention to the spacing device.

Another object of the invention is to provide a variable line spacing device for typewriters, that is simple in construction, reasonably inexpensive to manufacture and install and is efficient in operation and service.

This invention also consists in certain other features of construction and in the combination and arrangement of the several parts, to be hereinafter fully described, illustrated in the accompanying drawings and specifically pointed out in the appended claims.

In describing my invention in detail, reference will be had to the accompanying drawings wherein like characters denote like or corresponding parts throughout the several views, and in which:

Figure 1 is a fragmentary top plan view illustrating the application of one form of my invention to a typewriter.

Figure 2 is an edge elevation taken at right angles to Figure 1.

Figure 3 is a sectional view taken approximately on line 3—3 of Figure 1, looking in the direction of the arrows.

Figure 4 is a sectional view taken approximately on line 4—4 of Figure 2.

Figure 5 is a detail view of the pawl operating and setting housing.

Figure 6 is an edge elevation of one of the spur gear disks which forms a part of one of the sets of the planetary or crypto gears.

Figure 7 is a view of one of the ratchet internal gear rings.

Figure 8 is a sectional view taken through a fragmentary portion of a slightly modified form of the invention.

Figure 9 is a view showing the pawl housing for the form of the invention as shown in Figure 8, with the pawl operating levers disposed with their pawl engaging ends in their lowermost position.

Referring to the drawings in detail, the reference numeral 1 indicates the platen frame of a typewriter, and 2 the platen and my device is designed to take the place of the usual ratchet wheel which is secured to the platen shaft on the right hand side thereof.

In the form of the invention as shown, the platen 2 is provided with a circular recess 3 formed in one end and extending centrally from this recess and formed in the platen is a square cornered socket 4 which receives for slidable movement therein the squared end 5 of the platen operating stem or axle 6. The axle 6 is disposed in the usual bearing 7 secured to or formed with the platen frame 1 and has secured to its outer end an operating knob 8.

Secured to the shaft through the instrumentality of a pin or other securing means is a friction disk 9 having a diameter of a size whereby it will move freely in the circular recess 3 as will be apparent upon inspection of Figure 4.

A coil spring 10 surrounds the axle 6 and has its end convolutions disposed between the friction disk 9 and the inner surface of the

recess 3. This construction provides a clutch for the device whereby it can be operated through the medium of the knob 8 or the variable line spacing feature which will now be described.

Mounted for rotation on the shaft and being disposed in face to face relation with respect to the platen 1 is a disk 11 having a diameter the same as that of the platen and extending outwardly from the disk in equidistantly spaced relation with respect to each other are a plurality of pins 12 which are secured in said disk in any well known manner. In the form of the invention as shown, I use six of these pins 12 as will be noted upon inspection of Figure 3. Each of the sets of planetary or cryto gears include a hubbed disk 13 all of the same diameter and also being of the same diameter as the disk 11 and the platen. The hubs of the disks 13 are formed with teeth to provide spur gears which for distinction are indicated by the reference numeral 14. Extending from the outer side of each of the disks 13 and secured therein are pins 15, and these pins 15 are arranged in groups of six in the form of the invention as shown with the groups disposed in alignment with each other and the pins of each group in circular form disposed concentrically with the axis of the disks 13.

The pins 15 are also arranged in circular alignment with the pins 12 and these pins have loosely mounted thereon pinions 16 which mesh with the spur gears 14 and the internal gear teeth of ratchet internal gear rings 17 which have formed on their outer periphery ratchet teeth 18 disposed in a manner as best shown in Figure 7 of the drawings. An outer disk 19 is provided and this disk 19 is formed with serrated periphery 20 and is provided with a spur gear 21 to accommodate the pinions carried by the pins of the outermost hubbed disk 13.

Arranged in the front right hand corner of the platen frame is a right angle bracket 22 which has one portion formed with a bearing sleeve 23 for the purpose of accommodating the shank of the line spacing handle 24. The shank has formed with its inner end a lug 25 which is bifurcated for receiving a normally downwardly directed arm 26 having its lower end pivotally secured to a link 27 which is pivotally secured midway its ends to the said portion of said right angle bracket, as best shown in Figure 3 of the drawings. Stub shafts 28 are pivoted in said portion of the right angle bracket and the adjacent end of the platen frame, and these stub shafts 28 are fixed to the ends of a base piece 29 of a pawl housing 30 which as shown is substantially semi-cylindrical in shape and has extending from one end thereof a pin which pivotally receives one end of a link 31 while the opposite end of said link 31 is pivotally secured to the link 27.

By this construction, it will be apparent that when the handle 24 is operated, that the pawl housing will be moved in a vertical plane on the shaft 28.

The arcuate wall of the pawl housing is formed with a plurality of spaced slots 32 having recesses formed in one of their walls for the purpose of accommodating teeth arranged on one side edge of pawl operating levers 33 which extend through the slots 32 and are pivoted intermediate their ends in the pawl housing 30 as shown. Each of the ratchet rings is provided with a pawl indicated by the reference numeral 34 and these pawls have one of their ends pivotally secured in the housing 30 while their opposite ends are inclined downwardly for engagement with the ratchet teeth 18. The height of these pawls are regulated by the levers 33.

Secured to the right angle bracket 22 and extending in an upwardly inclination therefrom are a plurality of spring arms 35 having secured to their free ends rollers 36. A spring arm 35 is provided for each one of the ratchet rings and the rollers thereof are disposed in contacting engagement with the ratchet teeth 18 thereof as best shown in Figure 3, so as to prevent casual retrograde movement of the ratchet rings as will be apparent.

The outer disk 19 is provided with a spring arm 37 which also has one end fixed to the underside of the right angle bracket 22 while its opposite portion is arranged in contacting engagement with said outer disk 19 as best shown in Figure 2.

In Figure 8 of the drawings, I have illustrated a slightly modified form of my invention and in this form, it will be noted that I have eliminated the spur gear, pinions and ratchet ring, from the outermost disk which for distinction is indicated by the reference numeral 38. This disk 38 is however provided with pins 39 which secure the same to the adjacent hubbed disk 13. The outer periphery of the disk is serrated in the same manner as the outer periphery of the disk 19, whereby this disk 38 may be operated by hand for moving the respective planetary gearing sets and it is also operable by a pawl regulated by a lever which for distinction is indicated by the reference numeral 40 and this pawl is engageable with ratchet teeth 41 formed on the disk 38 inwardly of its serrated portion. In the forms of my invention as illustrated, there are three ratchet teeth on the disk 38 for every two on the ratchet rings, but the teeth on the disk 38 are smaller which results in disposing them closer together, which is also due to the fact that the circumference of the tooth bearing portion of the disk 38 is the same as the periphery of the ratchet rings.

The arrangement of the pawls of course effect the movement of the ratchet rings, and

the disk 38, and when the teeth of all of the levers 33 and the lever 40, are in the lowermost recesses of the slots formed in the pawl housings, the pawls become inoperative as to the respective ratchet rings and teeth 41 of the disk 38. When all of the teeth of the levers 33 and tooth of the lever 40 are in the recesses next to the bottom recesses, the pawls are adjusted to move the ratchet rings and the disk 38 the distance of one ratchet tooth space, and when the teeth of all of the levers 33 and tooth of the lever 40 are in the recesses above the last mentioned recesses, the pawls move the ratchet rings and disk 38, the distance of two ratchet teeth spaces, which is the greatest distance the ratchet rings can be moved in the form as shown, but the pawl of the disk 38 is capable of further adjustment for moving the disk 38 a distance of three ratchet teeth spaces, as it will be noted from Figure 9 that four recesses are provided for the lever of the pawl of the disk 38.

While I have shown the proportion of the inner spur gears to the outer ratchet rings as being of a ratio of one to two, it will be obvious that this proportion may be one to three, one to four or one to any other integer or whole number.

By inspection of Figure 3, it will be seen that if the ratchet ring or gear 17 and spur gear of the innermost set of planetary gearing rotate in the same direction, either at uniform angular velocities, intermittently or alternately through the same angle, they will impart to the pinions 16 thereof a planetary movement in the same direction and through the same angle, each gear contributing to this planetary movement in proportion to the ratio of the pitch diameter of one to that of the other, which in this case as above set forth is as two is to one. That is to say, the gear 17 will impart to the axis of the pinions 16 and consequently to the pivots or pins 12 carried by the disk 11, and the platen respectively, two-thirds of its angular movement and the gear 14 likewise one-third of its movement, so it may be stated that if the ratchet ring gear 17 is rotated through one ratchet space, it will rotate the platen through two-thirds of that angle which will measure approximately one-fifth of inch on the circumference of the platen and this movement may be termed one unit line space. The reason this movement is imparted to the platen rather than to the other sets of planetary gearing is due to the fact that the platen is free to move while the gearing is restrained by the spring arms 35 and 37. The movement of the gear 17 of the innermost set through one ratchet tooth space will move the platen one line space either alone or in addition to the motion coming from any other ratchet ring gear 17 of the other sets that may be moved at the same time.

Proceeding to the ratchet ring or gear 17

of the next set of planetary gearing, it will be seen that the parts of this set function the same way, that is if the ratchet ring or gear 17 of the said next set of platen gearing is rotated through one ratchet space, it will transmit two-thirds of its movement or one line space to the spur gear of the innermost set, which will pass one-third of its motion on to the pin or pivot carried by the disk 11, and the platen. In other words, a movement of one ratchet space of the ring gear 17 of the set next to the innermost set, will impart to the platen a movement of one-third of a line space either alone or in addition to any movement coming from any other ratchet ring gears so that if both ratchet ring gears of the innermost set and the next preceding set are operated simultaneously through one ratchet space they will move the cylinder through one and one-third line spaces. Extending the same principles to the remaining sets it will be found that one ratchet space movement of the ratchet ring gear 17 of the third set will move the platen one-ninth of a line space, the ratchet ring gear 17 of the fourth set one-twenty-seventh of a line space, and the ratchet ring gear 17 of the last set one-eighty-first of a line space. The disk 38 is capable of moving the platen a slightly greater distance than the last set of planetary gearing in the form of the invention as shown in Figure 4 due to the fact that the pawl of the ratchet teeth of the disk 38 moves the same a distance of three ratchet teeth spaces instead of only two which is the distance that the pawls of the teeth of the ratchet rings or gears 17, are capable of moving the same as above set forth.

By my device, the line space movements of the platen may be regulated from a minute fraction of an inch and upward including a space equal to the width of a space provided by the usual line spacing device now employed when the latter is set for three spaces. The platen can be regulated to this three line space when use is made of the outermost disk 38 as shown in Figure 8, and all the pawls are set to operate their respective ratchet rings and disk 38 through the greatest number of ratchet teeth spaces.

While a space of the greatest width is provided by the form of the invention as shown in Figure 8, the width of the spaces decrease in the successive use of the sets of planetary gears from the innermost set outwardly, and when the outermost set of planetary gears as shown in Figure 1, or the disk 38 in Figure 8 is operated alone through a single ratchet tooth space by their pawls, the space provided by such operation will be the smallest possible in each form of the invention as the movement imparted to the platen by use of the single sets of gears decrease in descending geometrical progression with the use of the sets of the planetary gears from the innermost set out-

wardly. It has been set forth however that the disk 38 is capable of imparting a slightly greater distance to the platen than the outermost set of planetary gears so as to provide for the three line space when the pawls are set to operate through their greatest number of ratchet teeth spaces.

When it is desired to disconnect the variable line spacing structure from the platen, the axle can be shifted longitudinally for disposing the friction disk out of contact with respect to the disk 11, and when the friction disk is disposed accordingly, the platen can be rotated in the usual manner through the medium of the knob 8.

While I have disclosed a plurality of sets of planetary gearings disposed for cooperation, I want it understood that I may employ only one set with the disk 11 and 20 of the form of the invention as shown in Figure 1 and with the disk 11 and disk 38 as shown in the form of the invention in Figure 8.

It is thought from the foregoing description that the advantages and novel features of my invention will be readily apparent.

I desire it to be understood that I may make changes in the construction and in the combination and arrangement of the several parts, provided that such changes fall within the scope of the appended claims.

What I claim is:

1. A variable line spacing device for a typewriter comprising an axle, a knob secured to one end thereof, means for securing the opposite end to the platen of the typewriter, a plurality of sets of planetary gearing loosely surrounding the axle, a disk having connection with one of said sets and being disposed at the inner ends thereof, means for connecting all of said sets for cooperation, clutch means for connecting the sets with said axle, and means for operating one or more sets.

2. A variable line spacing device for a typewriter comprising an axle having connection with the platen of said typewriter, a plurality of sets of planetary gearing loosely surrounding said axle, means for connecting the sets for cooperative association, clutch means for connecting the sets with the axle, and means for operating one or more sets, and adjusting means for the last mentioned means.

3. A variable line spacing device for a typewriter comprising an axle, a plurality of sets of planetary gearing loosely surrounding said axle, and each set including a hubbed disk, a spur gear formed with the hub of each disk, a plurality of pinions, a ratchet internal ring gear meshing with said pinions, a disk, means for connecting the pinions with the disk last mentioned and the respective hubbed disks for transferring motion from one set of planetary gearing to another and the said disk respectively, ratchet teeth

formed on the periphery of the ratchet internal gear rings, means engageable with the teeth of the ratchet internal gear rings for operating the sets, means for simultaneously operating the last mentioned means, and adjusting means therefor.

4. A variable line spacing device for a typewriter comprising an axle, a plurality of sets of planetary gearing loosely surrounding said axle, said sets being connected for cooperative association, means for simultaneously and selectively operating the sets, and clutch means for connecting and disconnecting said sets to the platen of the typewriter.

5. A variable line spacing device for a typewriter comprising an axle, means for slidably securing said axle to the platen of the typewriter, a plurality of sets of planetary gearing loosely surrounding said axle, means for connecting said sets for cooperative association, a disk having connection with one of said sets, clutch means cooperating with said disks and connecting said sets to said axle, a hand operated disk included in one set and having a serrated periphery, a ratchet ring included in each set, pawls adjustably mounted and co-operating with the ratchet rings for operating the sets, means for regulating the positions of said pawls with the teeth of said rings and means for simultaneously operating said pawls.

6. A variable line spacing device for a typewriter comprising an axle, means for slidably connecting said axle with the platen of the typewriter, a plurality of sets of planetary gearing loosely surrounding said axle, means for connecting said gearing for cooperative association, a disk having connection with one of said gearing, means co-operating with said disk for transferring motion from said gearing to the axle, a ratchet internal gear ring included in each set of gearing, means engageable with the teeth of the rings to prevent retrograde movement thereof, a plurality of pawls engageable with the teeth for simultaneously or selectively operating the sets of planetary gearing, means for regulating the position of said pawls, means for operating said pawls, and a handle linked to said last mentioned means.

7. A variable line spacing device for a typewriter comprising an axle having connection with the platen of said typewriter, a plurality of sets of planetary gearing loosely surrounding said axle, each set including a hubbed disk, a spur gear formed with the hub of the hubbed disk, a plurality of pinions, a ratchet internal ring gear meshing with said pinions, a disk, means for connecting the pinions with the last mentioned disk and hubbed disks respectively for transferring motion from one set of planetary gearing to the other and to the said disk, ratchet teeth formed on the peripheries of the ratchet internal ring gears.

a combination hand operated and ratchet disk, ratchet teeth formed on a portion of its periphery and being greater in number than the number formed on the ratchet ring gears, means for connecting said combination hand operated and ratchet disk to one of the hubbed disks, pawls adjustably mounted for imparting circular motion to the combination hand operated and ratchet disk and ratchet ring gears respectively, means for regulating the position of said pawls with respect to the teeth of said combination hand operated and ratchet disk and ring gears respectively, and means for simultaneously operating said pawls.

8. A variable line spacing device for a typewriter, comprising an axle having connection with the platen of said typewriter, a set of planetary gearing loosely surrounding said axle and including a hubbed disk, a spur gear formed with the hub of the hubbed disk, a plurality of pinions, a ratchet internal ring gear meshing with said pinions, said pinions meshing with the spur gear, a disk, means for connecting the pinions with said disk for transferring motion from the set of planetary gearing to said disk, ratchet teeth formed on the periphery of the ratchet internal ring gear, a combination hand operated and ratchet disk, ratchet teeth formed on a portion of its periphery and being greater in number than the number of teeth on the ratchet ring gear, means for connecting said combination hand operated and ratchet disk to the hubbed disk, pawls adjustably mounted for imparting circular motion to the ratchet teeth, means for regulating the position of said pawls with respect to said ratchet teeth and means for simultaneously operating said pawls.

In testimony whereof I affix my signature.
JOHN R. LYLE.