

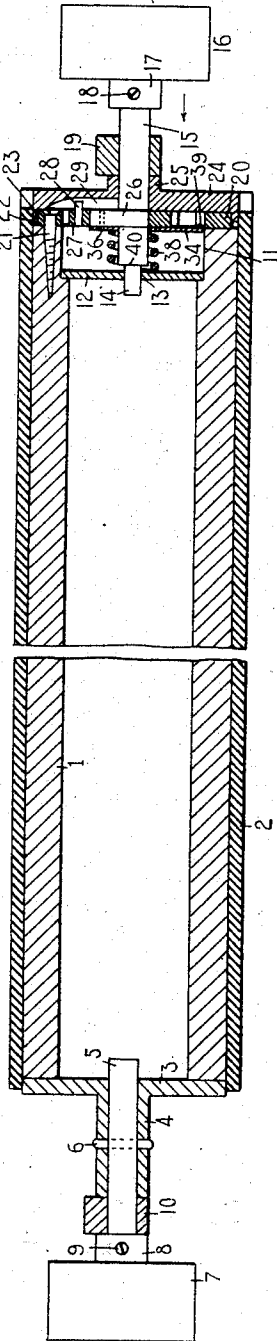
H. H. STEELE.
TYPE WRITING MACHINE.
APPLICATION FILED JULY 22, 1903.

902,012.

Patented Oct. 27, 1908.

2 SHEETS—SHEET 1.

Fig. 1.



WITNESSES:

K. V. Donovan.
M. F. Hammer.

Fig. 8.

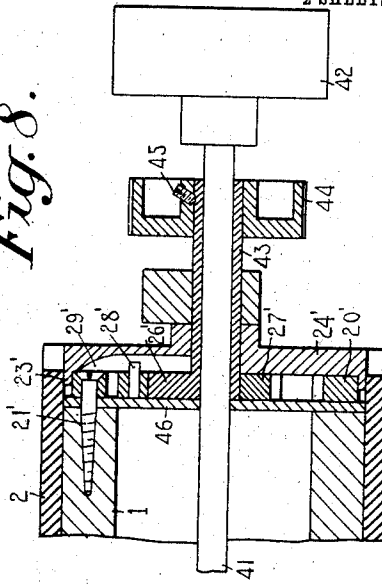


Fig. 9.

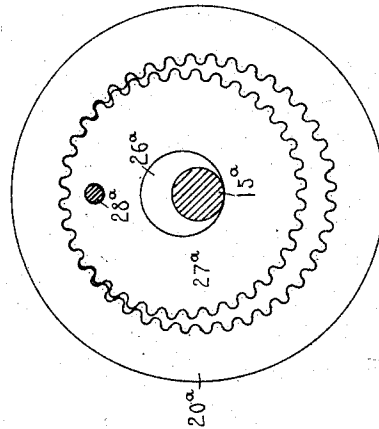
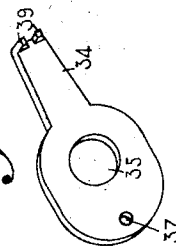


Fig. 7.



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2 SHEETS—SHEET 2.

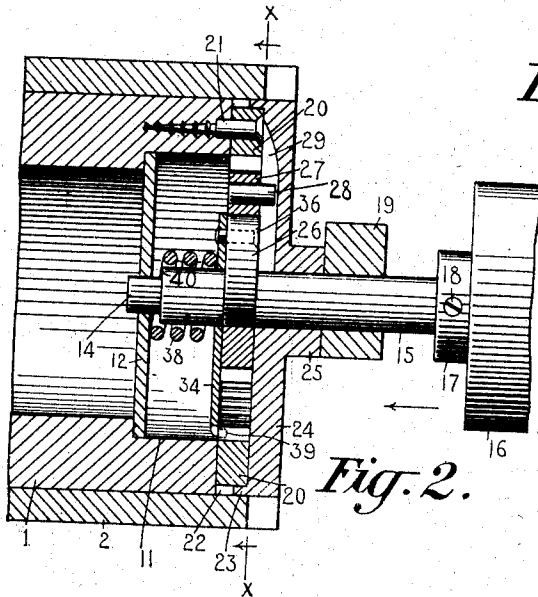


Fig. 2.

Fig. 3.

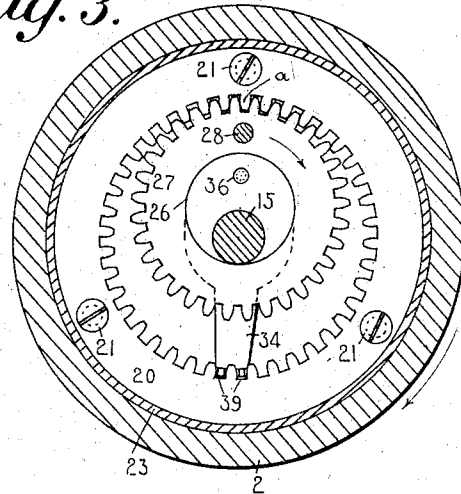


Fig. 5.

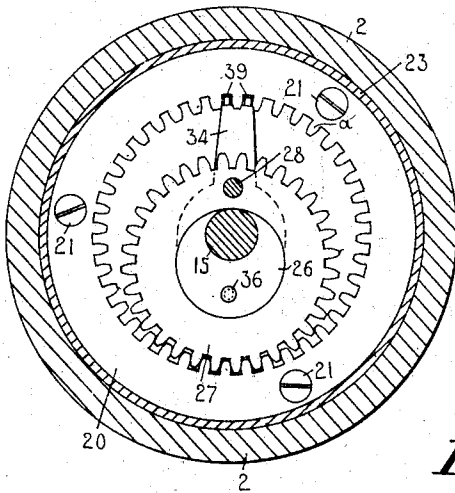


Fig. 4.

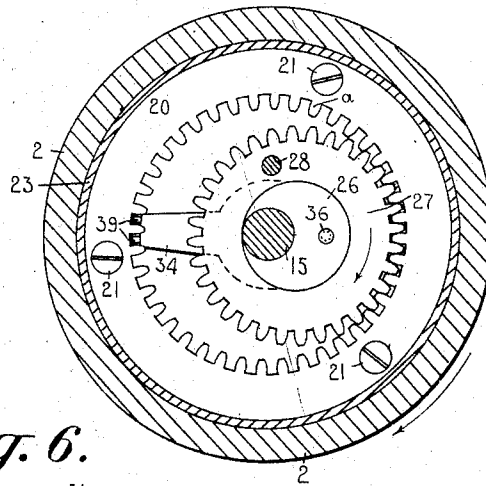
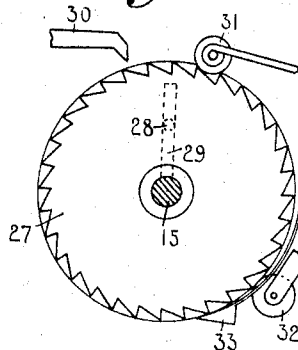


Fig. 6.



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UNITED STATES PATENT OFFICE.

HERBERT H. STEELE, OF WATERTOWN, NEW YORK, ASSIGNOR TO UNION TYPEWRITER COMPANY, OF JERSEY CITY, NEW JERSEY, A CORPORATION OF NEW JERSEY.

TYPE-WRITING MACHINE.

No. 902,012.

Specification of Letters Patent.

Patented Oct. 27, 1908.

Application filed July 22, 1903. Serial No. 166,595.

To all whom it may concern:

Be it known that I, HERBERT H. STEELE, citizen of the United States, and resident of Watertown, in the county of Jefferson and State of New York, have invented certain new and useful Improvements in Type-Writing Machines, of which the following is a specification.

My invention relates to typewriting machines and more particularly to the line spacing mechanism of such machines. The principal purpose of my invention is to provide means for fractional line spacing.

My invention consists in certain features of construction and combinations of parts which will be described herein and particularly pointed out in the appended claims.

My invention is illustrated in the accompanying drawings in which:—

Figure 1 is a longitudinal section through the center of a platen roller having my improvements. Fig. 2 is an enlarged view similar to Fig. 1 of the right hand end of the platen. Figs. 3, 4 and 5 are sectional views on the line $x-x$ of Fig. 2 and showing the parts in different positions. Fig. 6 is an end view of the platen roller and line spacing wheel with certain parts which cooperate therewith. Fig. 7 is a perspective view of a locking dog used in my construction. Fig. 8 is a section through the right hand end of a platen roller showing a modification of my invention. Fig. 9 is a face view similar to Figs. 3, 4 and 5, of a modification.

The same parts are designated by the same reference characters in different figures of the drawings.

The platen roller consists as usual of a hollow wooden cylinder 1 having a rubber sheath 2. At the left hand end there is attached to the roller an end piece 3 having integral therewith a sleeve 4 through which extends a spindle 5 fastened to said sleeve by means of a pin 6 passing through said sleeve and spindle. Said spindle has at its outer end a finger wheel 7 having a hub 8 rigidly fastened to the spindle 5 by means of a set screw 9. 10 represents one of the end bars of the platen frame ordinarily used in machines of this class.

At its right hand end the wooden cylinder 1 is recessed as shown at 11 and receives at the end of said recess a circular disk 12 hav-

ing at its center a hole 13 to receive the reduced end 14 of a spindle 15 having at its outer end a finger wheel 16 whose hub 17 is rigidly fastened to said spindle by a set screw 18. The spindle 15 passes through the other end bar 19 of the platen frame. I make the wooden cylinder slightly shorter than its rubber sheath at the right hand end and fasten to the end of said cylinder an internally toothed gear 20 by means of screws 21 passing through countersunk holes in said gear and screwed into the wooden cylinder.

The external diameter of the gear 20 is slightly less than the internal diameter of the rubber sheath thus leaving an annular space 22 into which projects an annular flange 23 from the line space ratchet wheel 24. Said line space wheel has a hub 25 journaled upon the spindle 15. The spindle 15 has fixed thereon or integral therewith an eccentric 26 on which is journaled a spur pinion 27 the teeth of which mesh with the teeth of the gear 20.

A pin 28 projects from the spur gear 27 into a radial slot 29 in the inner face of the wheel 24. The construction is such that the pin 28 is free to move in the slot 29 radially of the wheel 24 but said pin prevents the pinion 27 from rotating on its bearing 26 relatively to the wheel 24.

I have shown the gear 20 with 40 teeth and the gear 27 with 32 teeth.

In the ordinary operation of the machine the wheel 24 is operated by the usual pawl 30 and is held in any position to which said pawl moves it by the usual spring-pressed detent roller 31. I have also shown in Fig. 6 the usual pressure roller 32 and platen scale 33.

The parts being in the positions shown in Figs. 3 and 6, it will be observed that if the shaft 15 be turned by the finger wheel 16 in the direction of the arrow in Fig. 3, the eccentric 26 will move the pinion 27 so as to cause the same to roll over the internal tooth gear 20 but said pinion 27 will be prevented from rotating by the pin 28 engaging the side of the slot 29 in wheel 24 which is prevented from rotating by the detent roller 31.

If a complete rotation be imparted to the shaft 15 the 32 teeth of the pinion 27 will have engaged 32 of the teeth of the gear 20, and said pinion will have returned to its original position shown in Fig. 3. In this

movement the 32nd tooth of the pinion 20 will have been brought to the position occupied in Fig. 3 by the first tooth of said gear so that the gear 20 will have been rotated to the extent of 8 teeth. It would thus require 5 complete rotations of the shaft 15 to impart one complete rotation to the gear 20 and the platen roller. The one-fifth rotation of the wheel 20 caused by one complete rotation of the shaft 15 is not uniformly distributed throughout the whole of the rotation of the shaft 15, owing to the fact that the pinion 27, moving eccentrically as it does, is swung to a certain extent back and forth on the pin 28 as a pivot; but this inequality of motion is not important in a mechanism of this description. Fig. 4 shows the parts after the shaft 15 has been rotated about 90° from the position shown in Fig. 3, and Fig. 5 shows the parts after said shaft has been rotated about 180° from the position shown in Fig. 3. One of the teeth of the gear 20 has been marked with the letter "a" in these figures, to show its motion. While the pinion 27 does move about the pin 28 slightly as a pivot, the pin prevents the pinion 27 from making a rotation relative to the wheel 24.

It will be observed that the mechanism described constitutes a differential gear connection between the platen roller and the line space wheel whereby any degree of motion may be imparted to the platen roller relatively to said wheel. The form of differential gearing which I have described, I shall call a two-piece differential gear as only two toothed pieces are employed.

I am aware that other forms of differential gearing have been employed between a platen roller and a line space wheel but the particular form here described has advantages over any other form of which I am aware. It is highly desirable in such devices that there should be as little freedom of motion or backlash between these two members as possible and every additional element in the gearing that connects them in a fractional line space device adds to the amount of back-lash that is possible, especially after the gears have worn to some extent. It will thus be seen that the mere fact that there are but two gears in this device is in itself an advantage. Furthermore, it will be observed that in a differential gear of this description a large number of teeth are in mesh at the same time which lessens the back-lash referred to. Furthermore, the platen roller and line space wheel are frequently subjected to sudden jerks and shocks which are liable to be injurious to small pinions, and this form of gearing enables me to employ heavier gearing than could be put into the limited space available if other forms of differential gear were used; and also the large number of teeth in mesh at one time in my construction, adds

to its strength. In differential gearing of this description the impulse of the line space wheel 24 has but little tendency to move the gearing, and the mechanism so far described is capable of being used without further means for preventing motion of the line space wheel relatively to the platen. I prefer, however, to provide additional means for preventing accidental motion of the parts and for this purpose a plate 34 having a perforation 35 through which passes the shaft 15 is held rigidly against rotation on said shaft by a rivet 36 passing through the eccentric 26 and a hole 37 in the plate 34. A coiled spring 38 is compressed between the plate 34 and the disk 12, thus pressing the plate 34 against the gear 20. The shaft 15 has a sufficient endwise play to permit of the pressure of the plate 34 against the gear 20. The plate 34 may be a smooth plate acting on the gear 20 by friction and thus opposing any relative motion of the spindle 15 and the gear 20, and constraining the parts to move together. I prefer, however, to form on the end of said plate lugs 39 to pass between the teeth of the gear 20 and thus not only constrain the parts to move together, but also to positively lock them together. In the normal position in which the parts are held by the spring 38 the shoulder 40 formed by the reduced portion 14 of the spindle 15 is slightly removed from the disk 12 thus giving the spindle a slight endwise play. It will be observed that the parts are thus normally constrained to move together but by grasping the finger wheel 16 and sliding the spindle 15 inwardly against the tension of the spring 38 the parts are released and the spindle 15 may be rotated and the differential gearing operated to move the platen relatively to the line space wheel.

In case it is desired to dispense with the constraining means above described the modification shown in Fig. 8 may be employed. According to this modification the platen roller has the usual shaft 41 having fixed thereto at each end a finger wheel 42. The shaft 41 is rigidly connected to the roller at its left hand end but at its right hand end is surrounded by a sleeve 43 journaled on said shaft and having a finger wheel 44 secured thereto by a set screw 45. The wooden cylinder is made shorter than the rubber envelop as shown and is provided with a disk or head 46 through which the shaft 41 passes. A gear 20' similar to the gear 20 is fastened to the roller by screws 21' which also pass through the disk 46 and secure the same to the roller. A pinion 27' is journaled on an eccentric 26' rigid with the sleeve 43 and having a pin 28' constrained to move in a slot 29' in the line space wheel 24' which is journaled on the sleeve 43, and has a flange 23' in the annular space between the

gear 20' and the rubber sheath. The operation of this gear is in all respects similar to that above described and illustrated in Figs. 1 to 5 except that the spindle employed is here in the form of a sleeve and is turned by an additional finger wheel 44.

In Fig. 9 I have illustrated a modification of my invention in which instead of the ordinary cycloidal gear teeth shown in Figs. 1 to 5, I have shown rounded teeth. By the use of this form the gears 20^a and 27^a may be made of more nearly the same size, and the eccentricity of the journal 26^a may be less. In Fig. 9 I have shown the gear 20^a with 40 teeth and the gear 27^a with 36 teeth, so that upon one complete revolution of the shaft 15^a the gear 20^a would have moved only 4 teeth or one-tenth of a rotation, thus giving a higher multiplication. This form of gearing may be preferable in such a construction as that illustrated in Fig. 8.

I am aware that other modifications of my invention may be made without departing from the spirit thereof.

The principal uses for which my invention is intended are in connection with the use of a typewriter for writing on printed blanks or ruled paper and for making corrections. The paper is adjusted as near as it may be by means of the pawl 30 and detent roller 31 to the point at which it is desired to write, and the exact adjustment of the paper is then made by turning the finger wheel 16 in a manner that will be clearly understood from the description already given. In case the modification shown in Fig. 8 is used this adjustment may be made with any desired degree of accuracy but in case the form shown in Figs. 1 to 5 is used, the lugs 39 must be inserted in one or the other of the spaces between the teeth of the gear 20; but the distance to which the paper would be moved by moving the lugs 39 from one such space to the next is so slight that practically any desirable degree of exactness of adjustment may be attained with this form.

What I claim as new and desire to secure by Letters Patent, is:—

1. In a typewriting machine, the combination with a line-space wheel and a platen roller which are adapted to maintain a fixed relation when operated, of a two-piece differential gear mechanism connecting said wheel and platen; and means for manually operating said gear mechanism to vary the relation of said wheel and platen.

2. In a typewriting machine, the combination of a platen roller; an internally toothed gear fixed thereto; a spindle for said roller, a pinion journaled eccentrically on said spindle and meshing with said gear; a line-spacing wheel journaled on said spindle; and a pin and slot connection between said line-spacing wheel and said pinion.

3. In a typewriting machine, the combination with a line-space wheel and a platen roller which are adapted to maintain a fixed relation when operated, of a two-piece differential gear mechanism connecting said wheel and roller; and means for manually operating said gear mechanism to vary the angular relation of said wheel and roller.

4. In a typewriting machine, the combination with two members, one a platen roller and the other a line space wheel; of a differential gear connection between said members consisting of a concentric gear, fixed to one of said members, an eccentric gear meshing with said concentric gear; and means connecting the other of said members with said eccentric gear to prevent relative rotation of said member and said eccentric gear.

5. In a typewriting machine, the combination with two members, one a platen roller and the other a line-space wheel controlling said roller; of a differential gear connection between said members consisting of a concentric, internally toothed gear fixed to one of said members, an eccentric spur gear meshing with said concentric gear; and means to prevent relative rotation of said eccentric gear and the other of said members.

6. In a typewriting machine, the combination with a spindle and two members, one a platen roller and the other a line-space wheel, both mounted concentrically with said spindle; of a differential gear connection between said members comprising a concentric, internally toothed gear fixed to one of said members, a spur gear eccentrically journaled on said spindle and meshing with said concentric gear; means for preventing relative rotation of said eccentric gear and the other of said members; and manually operable means for turning said spindle.

7. In a typewriting machine, the combination with a platen roller and a line-space wheel, of a two-piece differential gear connecting said roller and wheel, one piece of said gearing being fast to the roller and the other having a pin and slot connection with the wheel.

8. In a typewriting machine, the combination with a platen roller and a line-space wheel, of a gear fast to the roller; a second gear having means for causing it to roll on the first mentioned gear; and means for preventing relative rotation of said second gear and said wheel.

9. In a typewriting machine, the combination with a platen roller and line-space wheel, of a spindle therefor, normally turning with said roller and wheel but capable of being turned in said roller and wheel; and means for varying the angular relation of said roller and wheel operated by turning the spindle in the roller and wheel.

10. In a typewriting machine, the combi-

- 4
- nation of a platen roller having a hollow portion; a line-space wheel; a spindle concentric with said roller and wheel and extending through the line-space wheel into the hollow portion and normally turning with said roller and wheel; and gearing in said hollow portion for varying the angular relation of the roller and wheel operated by an independent rotation of said spindle.
- 10 11. In a typewriting machine, the combination of a platen roller having a hollow portion; an internally toothed gear on said roller and in said hollow portion; a line-space wheel; a spindle extending through said line-space wheel into said hollow portion and normally turning with said roller and wheel; and a spur gear eccentrically journaled on said spindle and connected to said wheel; said gearing operated by imparting an independent rotation to said spindle.
- 15 12. In a typewriting machine, the combination with a platen roller having a hollow portion; a line-space wheel closing said hollow portion; and a spindle extending through said line space wheel into said hollow portion; said roller, wheel and spindle normally turning together; of means within said hollow portion for varying the angular relation of said roller and wheel and operated by imparting an independent rotary movement to said spindle.
- 20 13. In a typewriting machine, the combination with a platen roller having a spindle at one end rigidly connected to said roller and a second spindle at the other end of the roller and capable of being rotated independently of said roller; of a line-space wheel controlling said roller, and means for varying the relation of said wheel and roller, operated by independent rotation of said second spindle.
- 25 14. In a typewriting machine, the combination with a platen roller and a line space wheel; of a finger wheel; releasable means for connecting said platen and said finger wheel so that they turn together at the same rate of speed; and geared connections operated by said finger wheel when said connecting means are released for varying the angular relation of said platen roller and line space wheel.
- 30 15. In a typewriting machine, the combination with a platen roller and a line-space wheel, of gearing connecting said roller and wheel whereby the angular relation of the same may be varied; and a lock for said gearing.
- 35 16. In a typewriting machine, the combination of a spindle; a platen roller journaled on said spindle; a line space wheel also journaled on said spindle; gearing connecting said roller and wheel whereby the angular relation of the same may be varied; and means for locking the spindle, the roller and the wheel against relative rotation.
- 40 17. In a typewriting machine, the combination of a spindle; a platen roller and a line-space wheel on said spindle; gearing connecting said roller and wheel and operated by rotating the spindle independently of the wheel and roller; and means for locking the spindle against independent rotation.
- 45 18. In a typewriting machine, the combination with a platen roller and line space wheel, of means for varying the angular relation of said roller and wheel; a spindle having a rotary movement with relation both to the roller and to the wheel for operating said means, and having also an endwise movement; and a lock for said means operated by said endwise movement.
- 50 19. In a typewriting machine, the combination with a platen roller and a line space wheel, of gearing for varying the angular relation of said roller and wheel; a spindle having a rotary movement for operating said gearing, and having also an endwise movement; and a lock for said gearing operated by said endwise movement.
- 55 20. In a typewriting machine, the combination with a platen roller and a line space wheel, of gearing for varying the angular relation of said roller and wheel; a spindle having a rotary movement for operating said gearing, and having also an endwise movement; and a lock carried by said spindle and moved into and out of engagement with said gearing by endwise movement of said spindle.
- 60 21. In a typewriting machine, the combination with a platen roller and a line space wheel, of gearing for varying the angular relation of said roller and wheel; a spindle having a rotary movement for operating said gearing, and having also an endwise movement; and a lock spring-pressed into engagement with said gearing and released by endwise movement of said spindle.
- 65 22. In a typewriting machine, the combination with a platen roller and a line space wheel, of mechanism having motion relative both to the platen and to the line space wheel for varying the angular relation of said roller and wheel; a shaft, the turning of which operates said mechanism; and means normally opposing the operation of said mechanism but released by an endwise movement of said shaft.
- 70 23. In a typewriting machine, the combination with a platen roller and a line space wheel, of mechanism for varying the angular relation of said roller and wheel; a shaft, the turning of which operates said mechanism; and means spring pressed into engagement with said mechanism to normally oppose the operation thereof, but released by an endwise movement of said shaft.
- 75 24. In a typewriting machine, the combination of a platen roller; a spindle for said platen roller which normally turns with said
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platen roller but which may be turned independently of said platen roller; a line space wheel which normally turns with said platen roller; and means operated by said independent rotation of said spindle for varying the relation of said line space wheel and platen roller.

Signed at Watertown, in the county of Jefferson, and State of New York, this 20th day of July A. D. 1903.

HERBERT H. STEELE.

Witnesses:

F. E. STEELE,
M. A. DRURY.