H. H. STEELE.

TYPE WRITING MACHINE.

APPLICATION FILED MAY 3, 1905.

917,373.

Patented Apr. 6, 1909.

2 SHEETS—SHEET 1.

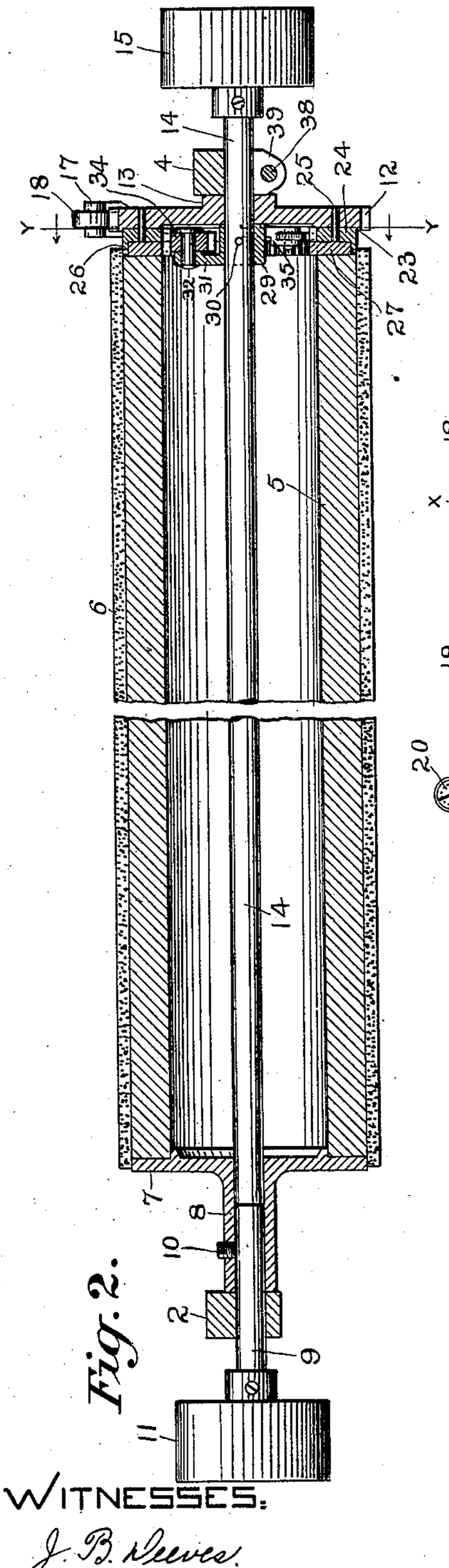


Fig. 2.

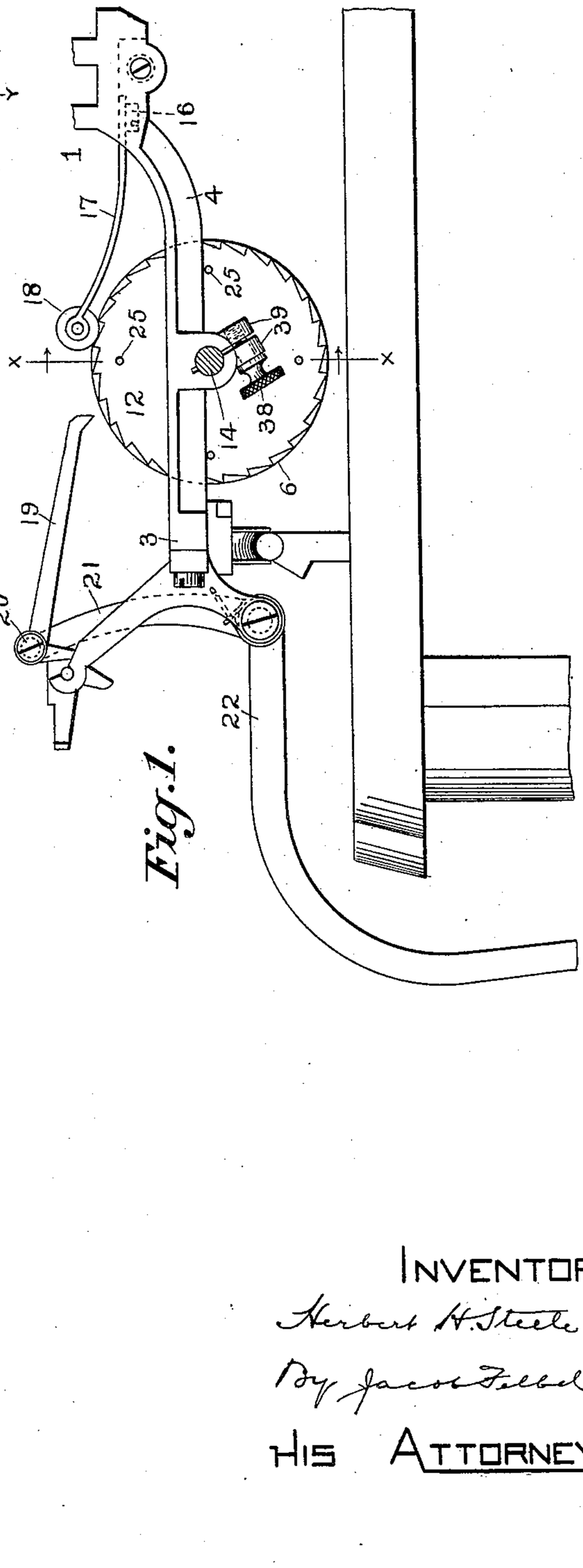


Fig. 1.

WITNESSES:

J. B. Reeves.

R. H. Strother.

INVENTOR:

Herbert H. Steele

By Jacob Tabel

HIS ATTORNEY

H. H. STEELE.

TYPE WRITING MACHINE.

APPLICATION FILED MAY 3, 1905.

917,373.

Patented Apr. 6, 1909.

2 SHEETS—SHEET 2.

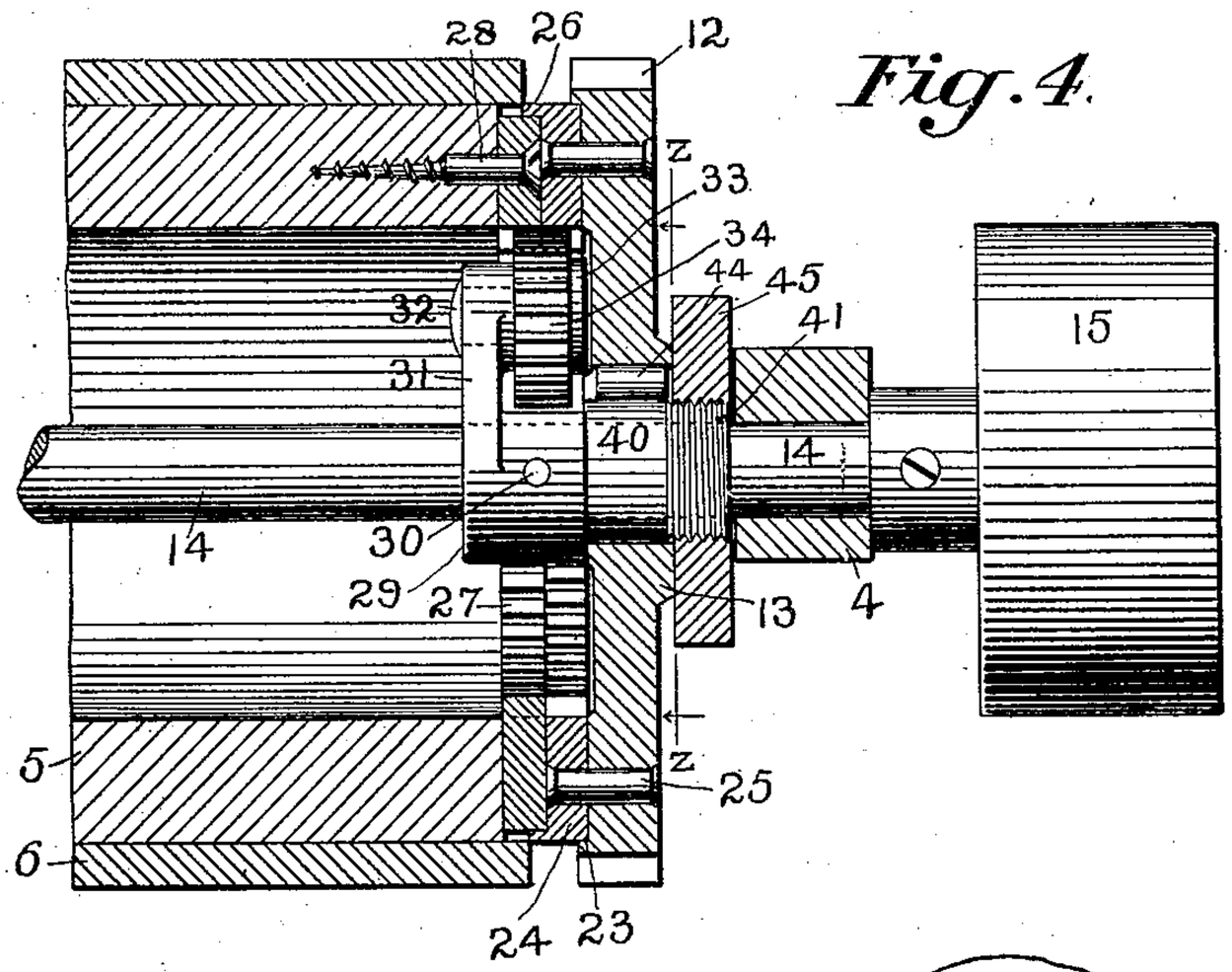
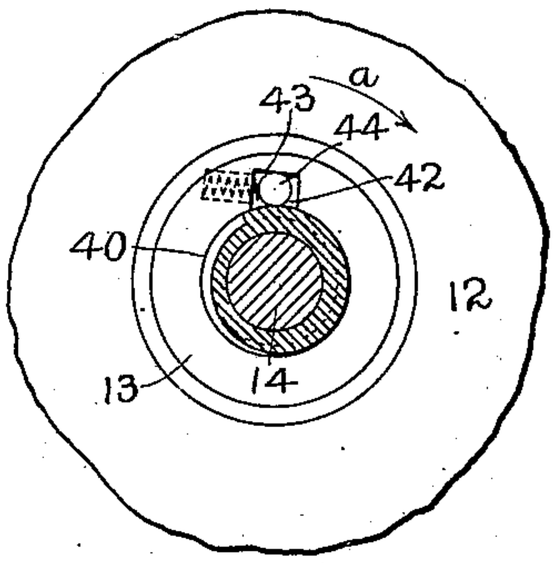


Fig. 4.



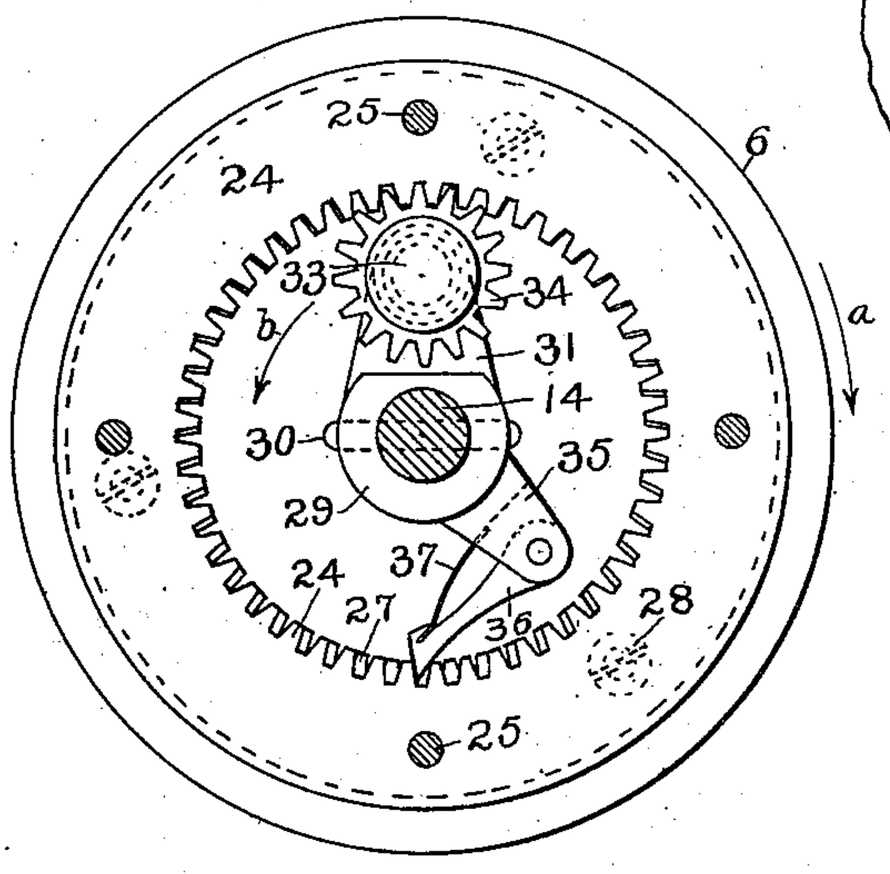


Fig. 5.

Fig. 3.

WITNESSES,

J. B. Deeves.

R. H. Strother.

INVENTOR.

Herbert H. Steele

By Jacob Felbel

HIS ATTORNEY

UNITED STATES PATENT OFFICE.

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

TYPE-WRITING MACHINE.

No. 917,373. Specification of Letters Patent. Patented April 6, 1909.

Application filed May 3, 1905. Serial No. 258,579.

To all whom it may concern:

Be it known that I, HERBERT H. STEELE, a citizen of the United States, and resident of Syracuse, in the county of Onondaga 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 that class of type-writing machines in which mechanism intermediate the platen and line-spacing ratchet wheel, operates to differentiate the rotation of the platen to the rotation of the ratchet wheel by the use of the line-spacing lever and pawl in ordinary line spacing.

The cylindrical platen ordinarily used on standard typewriting machines, consists of a rubber sheath, covering a hollow wooden cylinder or core. This sheath is elastic and it is made more or less elastic according to the character of the work to be executed on the typewriting machine. Of all the parts of a typewriting machine, this rubber sheath is the first to show the effects of wear. The continual hammering of the types (especially the punctuation marks) along fixed longitudinal paths, form depressions or pits in the surface of the platen, one line-space distance apart; and the unused portions of the platen between these longitudinal depressions become hardened and glazed. When the platen has reached this state the line-spacing becomes defective, due to the slipping away of the platen from the paper and a new platen covering is required which is a source of annoyance and expense.

It is a well known fact that the frequent vibration of the fiber of most of the products of india rubber tends to preserve their structure from decay and deterioration. The continual vibration tends to preserve its elasticity while if unused or not subjected to these vibrations, the rubber becomes hard and brittle and its elasticity is destroyed.

The continual vibration or hammering of the type against the platen at fixed longitudinal intervals, only subjects a small portion of the surface of the platen to these vibrations and the unused portions become glazed long before the operative sections have really lost their elasticity.

Hence, the primary object of my invention is to so differentiate the rotation of the platen to the rotation of the line space ratchet wheel that their unity or synchronism of rotation is destroyed and the platen is continuously presenting a new surface to the printing point through the ordinary use of the line-spacing lever and pawl; the entire surface of the platen will receive a uniform hammering or vibration from the type and long before the platen will reach a state where it will slip away from the paper, it will become so pitted by the period type that it will be impossible to get a good impression from the character-type, hence the life of the platen will be more than tripled and the slipping feature entirely eliminated.

Another object of my invention is to provide an auxiliary means to rotate the platen independently of the line-spacing mechanism through any desired arc, minute or large, so as to bring any desired line or space on the sheet being written to the printing-point.

Another object is to enable the operator to lock the differentiating mechanism so that the platen and ratchet wheel will rotate in unison, if so desired.

A fourth object is to enable the operator to use the right-hand finger-wheel to rotate the platen and ratchet-wheel in unison in a line-space direction and to rotate the platen independently of the ratchet-wheel when the said finger-wheel is turned in the opposite direction; also, that the left-hand finger-wheel may rotate platen and ratchet-wheel in either direction line-space distances.

These and other objects and advantages of my invention will hereafter more fully appear.

To these ends my invention includes features of construction and combinations of devices hereinafter described and more particularly pointed out in the appended claims.

The preferred form of my invention is illustrated in the accompanying drawings, forming part of this specification, in which,

Figure 1 is a side elevation of the carriage of a Remington typewriting machine embodying my improvements, the parts being in their normal positions. Fig. 2 is a vertical longitudinal section through the platen on a plane indicated by the line x—x, Fig. 1, looking in the direction of the arrows. Fig. 3 is an enlarged end elevation of the right-hand end of the platen, parts being shown in section on the line y—y, Fig. 2. Fig. 4 is an enlarged vertical section of the right-hand end of the platen and carriage

to illustrate modified parts. Fig. 5 is an end elevation of a portion of Fig. 4, parts being shown in section on the line *z*—*z*, same figure.

In the various views the same part will be found designated by the same numeral of reference.

1, designates the platen carriage or frame, comprising a left-hand end-bar 2, a front bar 3 and a right-hand end-bar 4.

The platen preferably comprises a hollow wooden cylinder or core 5 and a surrounding rubber sheath or cover 6. At the left-hand end of the platen is secured a circular platen-head 7 provided with an elongated hub 8 that extends to the inside of the end-bar 2; a short shaft 9 passes through the end-bar 2 and partially through the hub 8, where it may be secured to said hub by a set-screw 10. The free protruding end of said shaft is preferably provided with a finger-wheel 11 for turning the platen.

The right-hand end of the platen is provided with a line space ratchet-wheel 12 having a hub 13 that abuts the inside of the end-bar 4; a second platen shaft 14 passes through the end-bar 4, the hub 13, ratchet-wheel 12, the wooden cylinder 5, the platen-head 7 and the hub 8 to abut the end of the shorter shaft 9; the free or protruding end of the shaft 14 is also provided with a finger-wheel 15. At 16 on the frame 1 is secured by a screw, one end of a bar or leaf spring 17 which is forked at its opposite end and formed with suitable bearings for a detent 18 which in this instance is in the form of a small anti-friction roll capable of revolving freely on its pivot, although any other form of detent may be employed. The line space ratchet-wheel 12 is capable of being rotated in a line space direction by a pawl 19 that may be pivoted at 20 to a short arm 21 of a suitable line-spacing lever 22. The ratchet-wheel 12 is counterbored on its face toward the platen to form a shallow flange 23 that is concentric with the axis of the ratchet-wheel; an internally toothed member or gear 24 is introduced within said flange and permanently fixed to the ratchet-wheel by suitable rivets 25. The gear 24 is formed with a cylindrical flange 26 that may partially or wholly overlap the periphery of a second internally toothed member or gear 27 that is permanently fixed to the end of the wooden core 5 as by screws 28. While the drawings show the flange 26 formed integral with the gear 24 to overlap the gear 27, it is obvious that the said flange may form part of the gear 27 to overlap the periphery of the gear 24 with the same result; the only object of the flange is to provide a bearing for the right-hand end of the platen when it is rotated independently of the ratchet-wheel. With the construction as described, the gear 24 and ratchet-wheel 12 jointly form the right-hand platen head; the ratchet-wheel when rotated by its pawl 19 turns freely on the shaft 14 and the flange 26 will turn freely around the periphery of the gear 27, or if the finger-wheel 11 is rotated in either direction the gear 27 will rotate within the flange 26 independent of the ratchet-wheel which is held stationary by the detent 18, no connection having been described up to this point, between the ratchet-wheel and platen to rotate them in unison.

On the platen shaft 14 a hub 29 is mounted to abut the inside face of the ratchet-wheel to prevent end motion in one direction while the abutment of said shaft to the end of the shaft 9 within the hub 8 prevents end-motion of the shaft 14 in the opposite direction. The hub 29 may be fixed to the shaft 14 as by a rivet 30. 31 indicates an arm that is integral with the hub 29, and that is perforated adjacent the free end to receive a stud 32 having an enlarged portion or head 33. A toothed pinion 34 is mounted upon said stud to turn freely thereon between the head 33 and the arm 31 and the said stud may then be permanently fixed to the arm 31 in any suitable manner. The width of the working face of the pinion 34 may be a little less than the combined width of the two gears 24 and 27 and the relative location of said pinion to said gears is central of their combined width so that the teeth of both gears 24 and 27 are always in operative engagement with the teeth of the pinion. Owing to the limited space within the platen, a portion of the hub 29 is removed adjacent the arm 31, to give a greater space between the gears 24 and 27 and the said hub for the rotation of the pinion 34, so that said pinion may be made as large as possible.

35 indicates a second arm formed integral with the hub 29, that may be forked at the free end to receive a pivoted pawl 36 that normally is spring-pressed into engagement with the teeth of the gear 24 by a suitable spring 37 as shown in Fig. 3. The pawl 36, by interlocking between two adjoining teeth of the gear 24, prevents independent rotation between the shaft and the ratchet-wheel in one direction but will permit of independent rotation of either in the opposite direction for purposes presently to appear.

The bearing for the shaft 14 in the end-bar 4 is slit as shown in Fig. 1 and a shouldered thumb-screw 38 coöperating with suitable ears 39 on either side of said slit, tends to close up the slit and bind the end-bar to the shaft 14 to hold the latter stationary under certain conditions but not under any circumstance to bind it to such a degree that the said shaft may not readily be turned by the finger-wheel 15 in either direction.

In the modification illustrated in Figs. 4 and 5, the hub 29 has only the one arm 31 but the said hub is elongated to form a

shouldered cylindrical sleeve 40 and the extreme end is screw-threaded as shown at 41. The ratchet-wheel 12 is loosely mounted on the sleeve 40 and provided with an elongated opening or slot 42 to expose a portion of the sleeve 40 interiorly of said wheel; the end wall 43 of said opening or slot is pitched a few degrees out of parallelism with a line tangent to the axis of the ratchet-wheel, the angle of the wall 43 converging toward the tangent in a line-space direction. A roller 44 is spring-pressed in the direction of normal rotation of arrow *a*, to form a wedge between said ratchet-wheel and said sleeve 40. A nut 45 is threaded on the screw portion of the sleeve 40 between the hub 13 and the end-bar 4; when the said nut is threaded along the sleeve to bind against the hub 13 as shown in Fig. 4, a slight opening is made between the nut and the end-bar 4, and when the nut is threaded in the opposite direction to abut against the end-bar 4 a slight space or gap is formed between the hub 13 and the nut, for purposes presently to appear. All the remaining parts shown in Fig. 4 are the same as those already described in the preferred form of my invention.

Any form of ratchet-wheel and line-spacing mechanism may, of course, be employed. For convenience, I have shown herein the usual construction found on a No. 6 Remington typewriting machine.

Normally, the internal toothed gears 24 and 27, the hub 29, the pinion 34 and pawl 36 are in position, as shown in Fig. 3; the detent roll 18 spring-pressed between two adjoining teeth of the ratchet-wheel 12 and the thumb-screw 38 applying a certain degree of friction to the platen shaft 14 at the end-bar 4. If the line space pawl 19 be actuated by the line-spacing lever 22, the ratchet-wheel 12 is turned equal or line-space distances according to the distance apart of the notches or spaces between the teeth of the ratchet-wheel and the throw of the line-spacing pawl. The platen would also be fed similar distances in the same direction with ordinary construction of platen driving mechanism, but through the use of the mechanism already described a slight differential movement is maintained between the ratchet-wheel and platen at each line-spacing movement of the pawl 19, as follows:—

The internal toothed gear 24 has forty-eight teeth and the internal toothed gear 27 only forty-seven teeth; the shaft 14 and arm 31 being stationary by reason of the friction applied at the end-bar 4, any movement of the ratchet-wheel and the gear 24 in a line space direction will rotate the pinion 34 on its axis 32 and as the said pinion is always in operative engagement with both gears 24 and 27, the pinion 34 will drive the gear 27 in the same direction. If the two gears 24 and 27 had a similar number of teeth the platen would be turned in unison with the ratchet-wheel, but as the gear 27, that is fixed to the platen, has only forty-seven teeth, there must be a differential movement between the platen and ratchet-wheel or the two independent members would become wedged together and no rotation would be possible without rotating the pinion 34 relative to the platen axis. The amount of this differentiation is equal to the difference in the number of teeth in the two gears 24 and 27 for every complete revolution of the ratchet-wheel. If the diametral pitch of the gears 24 and 27 is forty, then the amount of differentiation will be one-fortieth of an inch at the pitch circle of the gears or approximately one thirty-second of an inch at the periphery of the platen. Ordinarily, there are twenty-eight teeth in the ratchet-wheel or fourteen double line-space distances to every revolution of the platen, hence the differential movement between platen and ratchet-wheel will approximately be two one-thousandths of an inch for every double line-space distance of rotation by the ratchet-wheel. The platen will make a considerable number of revolutions before any point on its surface will be brought exactly to the printing point a second time.

The gear 24, being permanently fixed to the ratchet-wheel 12, may be considered the driver and the gear 37 the driven gear when the ratchet-wheel is rotated by the line-spacing pawl 19, hence as the gear 24 has forty-eight teeth and the gear 27 forty-seven teeth or one tooth less, the rotation of the gear 24 in either direction must increase the velocity of the gear 27 by the amount of differentiation between the two gears; that is to say, if the gear 24 is rotated one complete revolution its forty-eight teeth are successively brought into operative engagement with the teeth of the pinion 34 and the latter must engage a similar number of teeth in the gear 27, but as the gear 27 has only forty-seven teeth it is obvious that the said gear must rotate through forty-eight tooth distances or one tooth distance more than a complete revolution for every revolution of the gear 24. Hence for every revolution of the ratchet-wheel by the pawl 19, the platen will differentiate its rotation by approximately one thirty-second of an inch in advance of the ratchet-wheel in a line space direction.

While I have shown and described the gears 24 and 27 as having forty-eight and forty-seven teeth respectively, it will be understood, of course, that the gear 24 may have forty-seven teeth and the gear 27 forty-eight teeth; the only effect this change would have, would be to reverse the direction of differentiation in rotation between the two gears so that the platen would fall short of a complete revolution by the distance of one

tooth for every revolution of the ratchet-wheel.

When a sheet of paper is to be inserted around the platen the finger wheel 15 may be turned in the usual line space direction, as indicated by the arrow *a*, Fig. 3; the pawl 36 will interlock between two adjoining teeth of the gear 24 and force the ratchet-wheel to rotate against its spring-pressed detent 18; the gear 24 and pinion 34 will rotate in unison relative to the platen axis, hence the intermeshing teeth of said pinion with the teeth of the gear 27 act as fixed dogs to rotate both gears in unison with the ratchet-wheel. Similarly in Fig. 5, if the shaft 14 be turned in the direction of the arrow *a*, the spring-pressed roll 44 becomes wedged between the sleeve 40 and the wall 43 of the ratchet-wheel, causing the said wheel, sleeve and shaft to rotate in unison in a line space direction.

From the foregoing description it will be understood that the platen may be turned in the usual line space direction by the finger-wheels 11 and 15 and that by turning the said wheel 11 in a reverse direction, the platen may be turned backwardly step by step through uniform distances corresponding to the spacing of the ratchet-wheel 12, but if the finger-wheel 15 be turned in a reverse direction, as indicated by the arrow *b*, a very different effect is produced.

When the finger-wheel 15 is turned backwardly or in the direction of the arrow *b*, Fig. 3, the shaft is rotated within the end-bar 4, the hub 13 and ratchet-wheel 12, the latter being held stationary by its detent 18; the hub 29, arm 31 and pinion 34 will rotate in unison with the said shaft 14. The gear 24 is held stationary with the ratchet-wheel, hence the pinion 34 in rotating around the platen axis must rotate on its own axis 32. Were the teeth in both gears 24 and 27 similar in number, the pinion 34 would simply rotate around the gears without affecting either platen or ratchet-wheel, but by the differentiation of the one tooth in the said gears, the pinion in rotating around the fixed gear 24 must bring successive teeth in the gear 27 to aline with the engaging teeth in the gear 24, hence there will be a slight rotation of the platen in a direction opposite to the direction of rotation of the finger-wheel 15, or in a line space direction. The amount of this independent rotation of the platen, as previously explained, will be one thirty-second of an inch for every complete revolution of the finger-wheel; and may be subdivided into forty-eight parts or one sub-division for each tooth of the gear 24 that coacts with the pawl 36, which will give a possible fractional spacing of approximately one one-thousandth of an inch for each sub-division between the usual line space distances. During this rotation of the pinion 34 around the gears 24 and 27, the pawl 36 will rise and fall over each succeeding tooth of the gear 24 through the resilience of the spring 37.

With this description it will be seen that the platen may be turned or fed independent of the ratchet-wheel in one direction by the rotation of the finger-wheel 15 for any desired distance, either through a minute arc or through a larger arc, thus providing for fractional line-spacing and facilitating the work of making corrections, writing on ruled paper and printed forms with blank spaces therein to be filled out with the typewriter. With the arrangement of the gears as shown and described, the predetermined point of the paper is arrested on the platen at the nearest position to the rear of the printing-point and the platen advanced in a line space direction to the printing point. By the reversal of the relative number of teeth in the gears 24 and 27 the direction of independent rotation of the platen by the finger-wheel 15 will also be reversed, and hence the predetermined point of the paper will be moved beyond the printing point and then moved backwardly by the finger-wheel 15 to the printing point.

To recapitulate the operation of my invention, when the line space wheel is operated the platen turns in forward or line space direction, but not exactly in unison with said line space wheel. When the finger-wheel 11 is turned forward or in line space direction the platen is turned in unison with the finger wheel and the line space wheel is also turned but not quite in unison with the platen and finger wheel. When the finger wheel 11 is turned backward the platen and line space wheel turn backward in unison, due to the operation of the pawl 36 in the first form of the invention and of the roller clutch 44 in the other form. When the finger wheel 15 is turned forward the platen and line space wheel are turned forward in unison with each other and with said finger wheel. When the finger wheel 15 is turned backward the line space wheel remains stationary and the platen turns forward very slowly, that is to say, it turns to the extent of one tooth of the gear wheel 27 for a complete rotation of the finger wheel 15. It will be seen that this finger wheel 15 turns the platen forward whether said finger wheel be turned forward or backward, but with different speeds in the two instances.

It may be convenient sometimes to have the platen and ratchet-wheel rotate in unison and to this end, as shown in Fig. 4, the nut 45, when threaded against the hub 13 of the ratchet-wheel 12, binds the said wheel between the shouldered portion of the sleeve 40 and the nut 45 and the ratchet-wheel may be turned in unison with the platen through uniform spaces by the pawl 19 or either finger-wheel 11 or 15. When the ratchet-wheel is released by the nut 45, said nut is brought into contact with the end-bar 4 to

bind said bar between said nut and the hub of the finger-wheel 15, to hold the shaft 14 and pinion 34 stationary relative to the platen axis as in the case of the thumb-nut 38, as shown in Fig. 1.

Various changes in details of construction and arrangement of parts may be made without departing from the spirit of my invention.

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

1. In a typewriting machine, the combination of a platen; a line space ratchet-wheel; a line-spacing pawl; differential gears connecting the platen with the ratchet-wheel; a pinion to coact with said gears to differentiate the rotation of the platen to the rotation of the ratchet-wheel by the line-spacing pawl; and means to coact with the teeth of one of said differential gears to rotate the platen and ratchet-wheel in unison in a line-space direction.

2. In a typewriting machine, the combination of a platen; a line space ratchet-wheel; a line-spacing pawl; differential gears connecting the platen with the ratchet-wheel; a pinion to coact with said gears to differentiate the rotation of the platen to the rotation of the ratchet-wheel by the line-spacing pawl; and a pawl to coact with the teeth of one of said gears to rotate said platen and ratchet-wheel in unison, in a line-space direction.

3. In a typewriting machine, the combination of a platen; a line space ratchet-wheel; a spring-pressed detent; differential gears connecting the platen with the ratchet-wheel; a pinion in operative engagement with said gears; and means to rotate said pinion within said gears to turn the platen independently of the ratchet-wheel when rotated in one direction and to turn the platen and ratchet-wheel in unison, when rotated in the reverse direction.

4. In a typewriting machine, the combination of a platen; a line space ratchet-wheel; a detent; differential gears connecting the platen with the ratchet-wheel; a pinion in operative engagement with said gears; a platen shaft to rotate said pinion within said gears in one direction to move the platen independently of the ratchet-wheel; and means to rotate the platen and ratchet-wheel in unison when said shaft is rotated in the reverse direction.

5. In a typewriting machine, the combination of a platen; a line space ratchet-wheel; a spring-pressed detent; differential gears connecting the platen with the ratchet-wheel; a pinion in operative engagement with said gears; a platen shaft to rotate said pinion within said gears in one direction to move the platen independently of the ratchet-wheel; and means for causing the platen and ratchet-wheel to rotate in unison when said shaft is rotated in the reverse direction.

6. In a typewriting machine, the combination of a platen; a line space ratchet-wheel; a spring-pressed detent; differential gears connecting the platen to the ratchet-wheel; a pinion in operative engagement with said gears; a platen shaft to rotate said pinion within said gears in one direction; and a device to rotate the pinion and ratchet-wheel in unison when said shaft is turned in the reverse direction.

7. In a typewriting machine, the combination of a platen; a line space ratchet-wheel; a spring-pressed detent; differential gears connecting the platen with the ratchet-wheel; a pinion in operative engagement with said gears; a platen shaft to rotate said pinion within said gears in one direction; a device to rotate the pinion and ratchet-wheel in unison when said shaft is turned in the reverse direction; and means to temporarily bind the ratchet-wheel to the said shaft that ratchet-wheel and platen may be turned in unison in either direction by the finger-wheel.

8. In a typewriting machine, the combination of a platen; a line space ratchet-wheel; a spring-pressed detent; differential gears connecting the platen with the ratchet-wheel; a pinion in operative engagement with said gears; a platen shaft to rotate said pinion within said gears in one direction; a device to rotate the pinion and ratchet-wheel in unison when the said shaft is turned in the reverse direction; and a nut to temporarily bind the ratchet-wheel to said shaft that the platen and ratchet-wheel may be turned in unison in either direction by the finger-wheel.

9. In a typewriting machine, the combination of a platen; a finger wheel; and means whereby said finger wheel turns said platen in one direction whether said finger-wheel be turned forward or backward.

10. In a typewriting machine, the combination of a platen; a finger-wheel; means whereby said finger-wheel, when turned in one direction, turns said platen; and means whereby said finger-wheel, when turned in the other direction, turns said platen more slowly.

11. In a typewriting machine, the combination of a platen; a line space wheel; a finger wheel; and means operated by said finger wheel for turning the platen and the line space wheel together when said finger wheel is turned in one direction and for turning the platen independently of the line space wheel and at a lower rate of speed than the finger wheel when said finger wheel is turned in the other direction.

12. In a typewriting machine, the combination of a platen; a line space wheel; a detent for said line space wheel; a finger wheel; differential gearing whereby when said finger

wheel is turned in one direction the platen is turned slowly in the opposite direction relatively to the line space wheel; and means whereby when said finger wheel is turned in the opposite direction said line space wheel is turned in unison with said finger wheel.

13. In a typewriting machine, the combination of a platen; a line space wheel; a detent for said line space wheel; a finger wheel; and means including differential gearing whereby when said finger wheel is turned in one direction the platen is turned relatively to the line space wheel and when said finger wheel is turned in the opposite direction the line spacing wheel and platen are turned in unison.

14. In a typewriting machine, the combination of a platen; a line space wheel; differential gearing between said platen and line space wheel, a line space pawl for operating the parts above recited to cause the platen and line space wheel to turn differentially, and a finger wheel constantly connected up for operating said parts to cause said platen and line space wheel to turn in unison.

Signed at the borough of Manhattan, city of New York, in the county of New York, and State of New York, this 2d day of May, A. D. 1905.

HERBERT H. STEELE.

Witnesses:
E. M. WELLS,
J. B. DEEVES