J. B. SECOR.

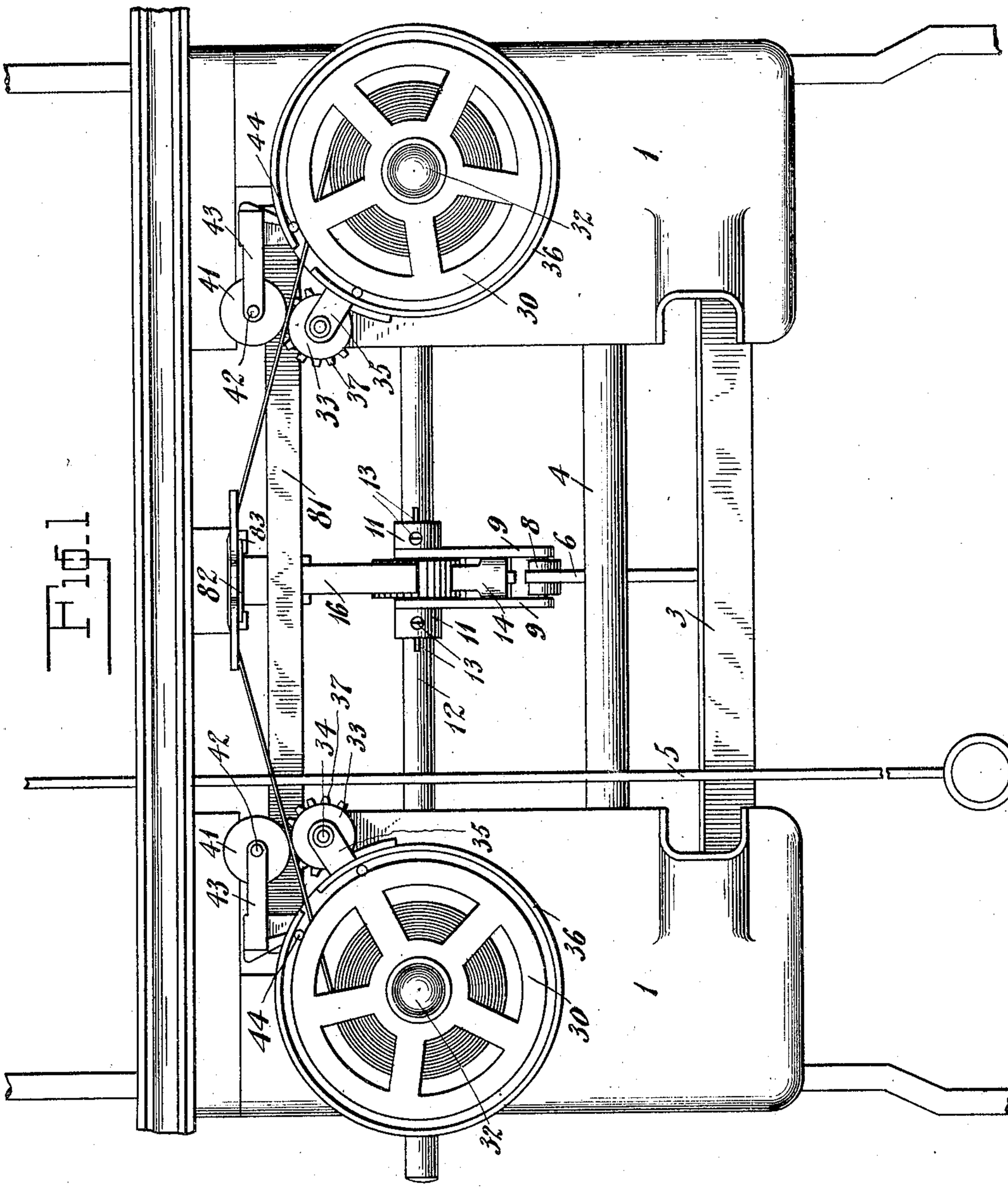
RIBBON FEEDING MECHANISM.

APPLICATION FILED OCT. 3, 1905. RENEWED AUG. 29, 1908.

952,281. Patented Mar. 15, 1910.

8 SHEETS—SHEET 1.

FIG. 1




Witnesses.
William Spanbock
Nathan A. Shaw

Inventor
Jerome B. Secor
By his Attorneys
Knight Bros

J. B. SECOR.

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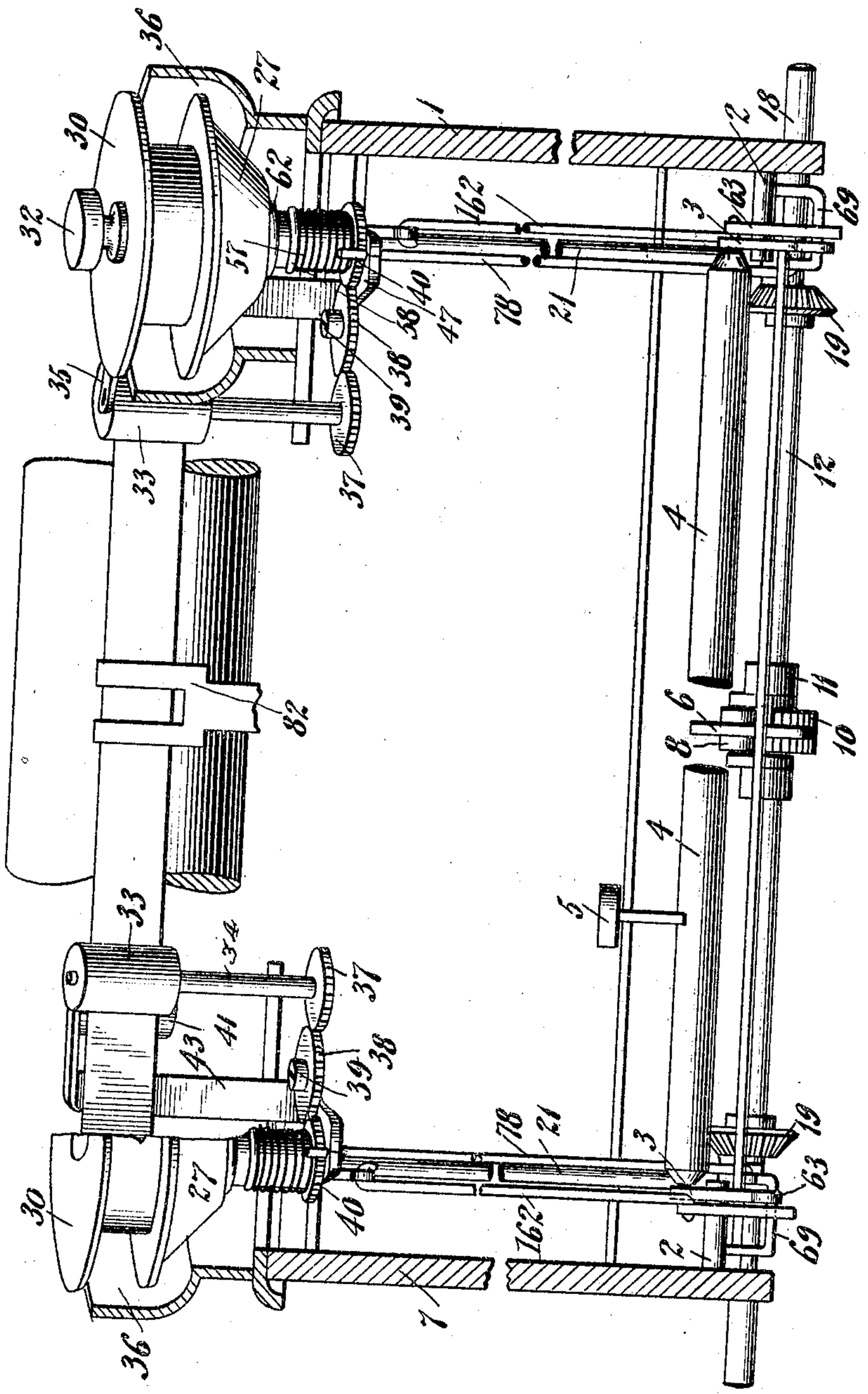
8 SHEETS—SHEET 2.

Fig. 2.




Witnesses
William Spanbock
Nathan Cohen

Inventor
Jerome B. Secor
By his Attorneys
Knight Bros

J. B. SECOR.

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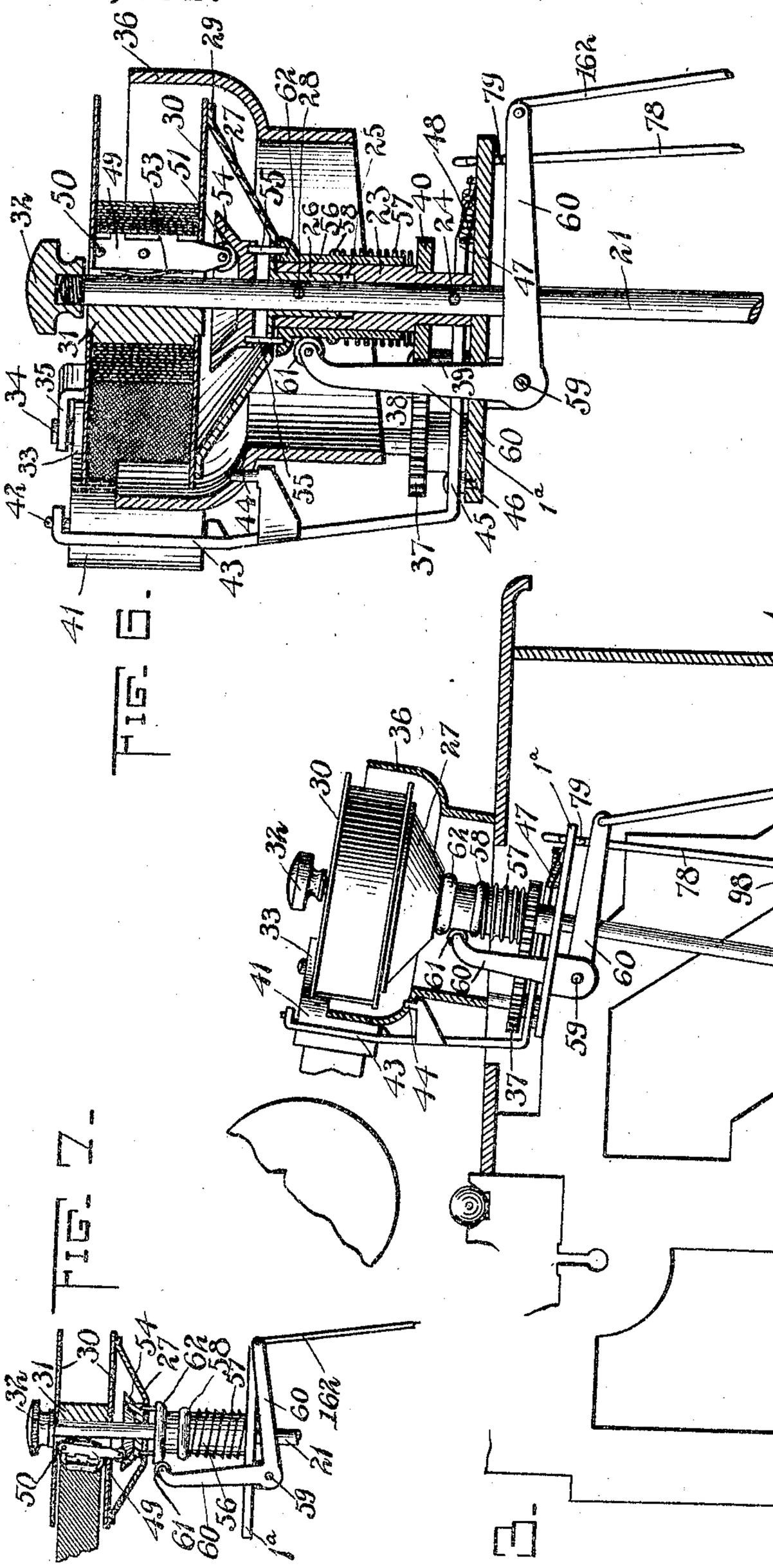

FIG. 5.



FIG. 6.



FIG. 7.



FIG. 8.

Witnesses
S. J. Hunter.
William Spanbock

Inventor
Jerome B. Secor
By his Attorneys
Knight Bros.

J. B. SECOR.

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8 SHEETS—SHEET 4.

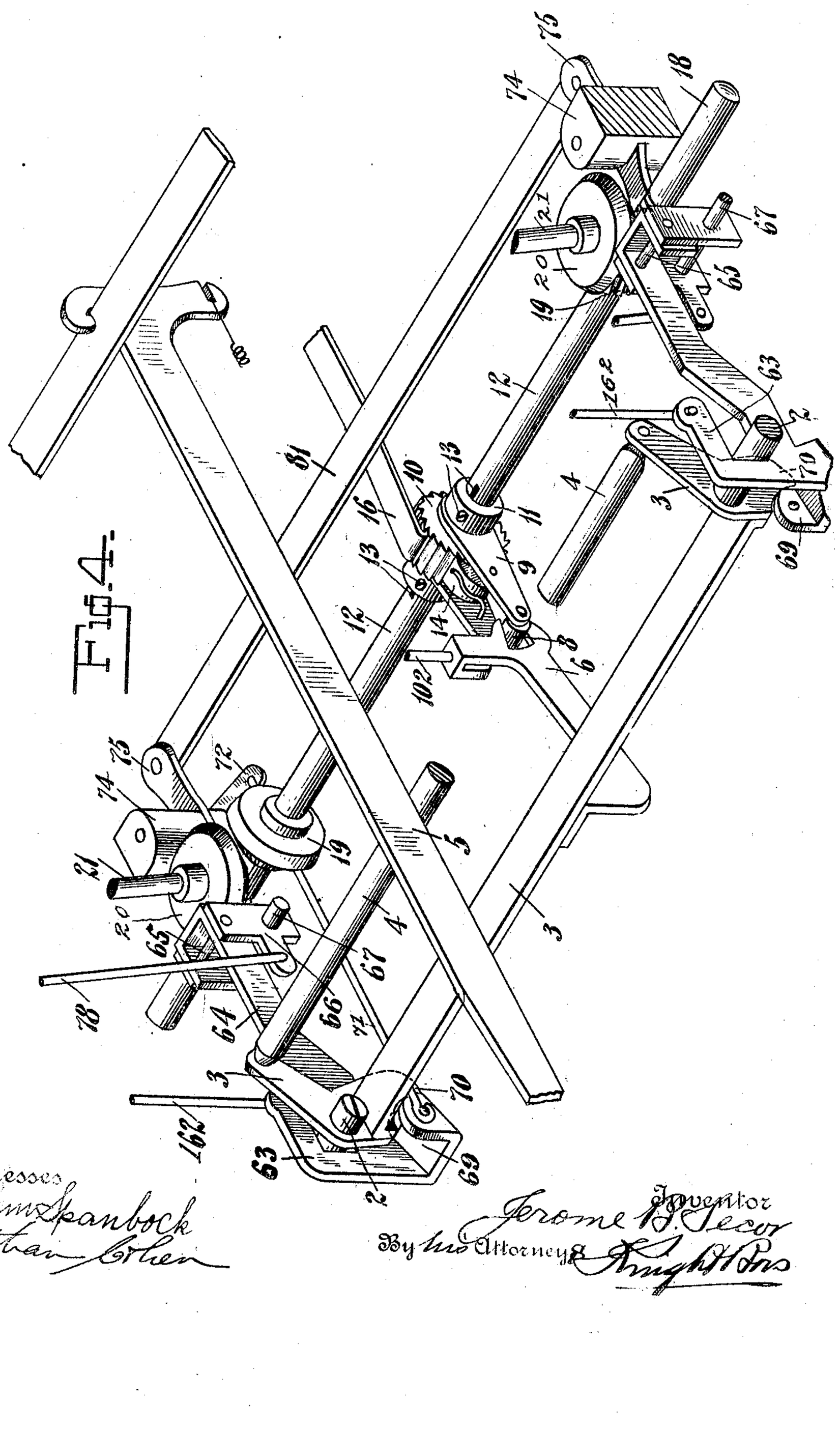


FIG. 4.

Witnesses
William Spanbock
Nathan Cohen

Inventor
Jerome B. Secor
By his Attorneys
Knight Bros

J. B. SECOR.

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8 SHEETS—SHEET 5.

FIG. 12

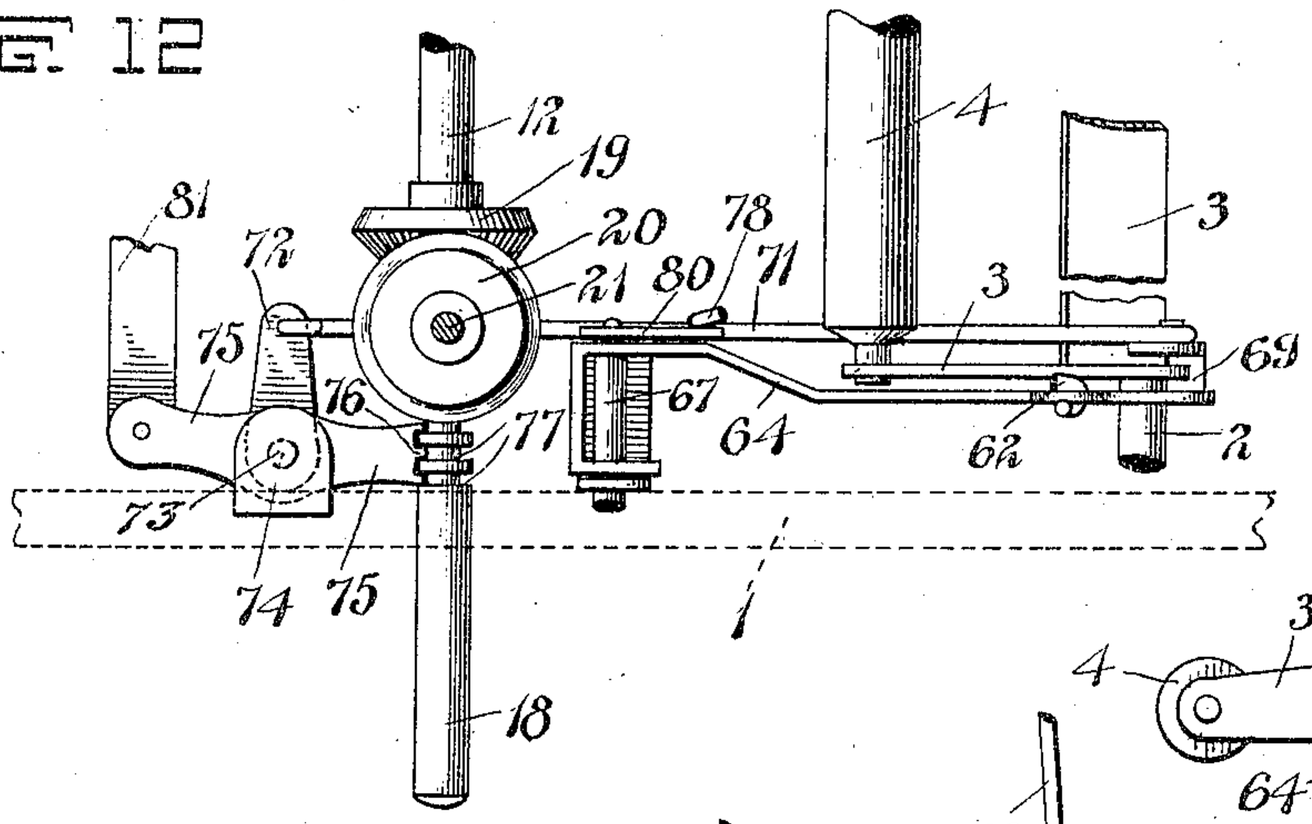



FIG. 13.

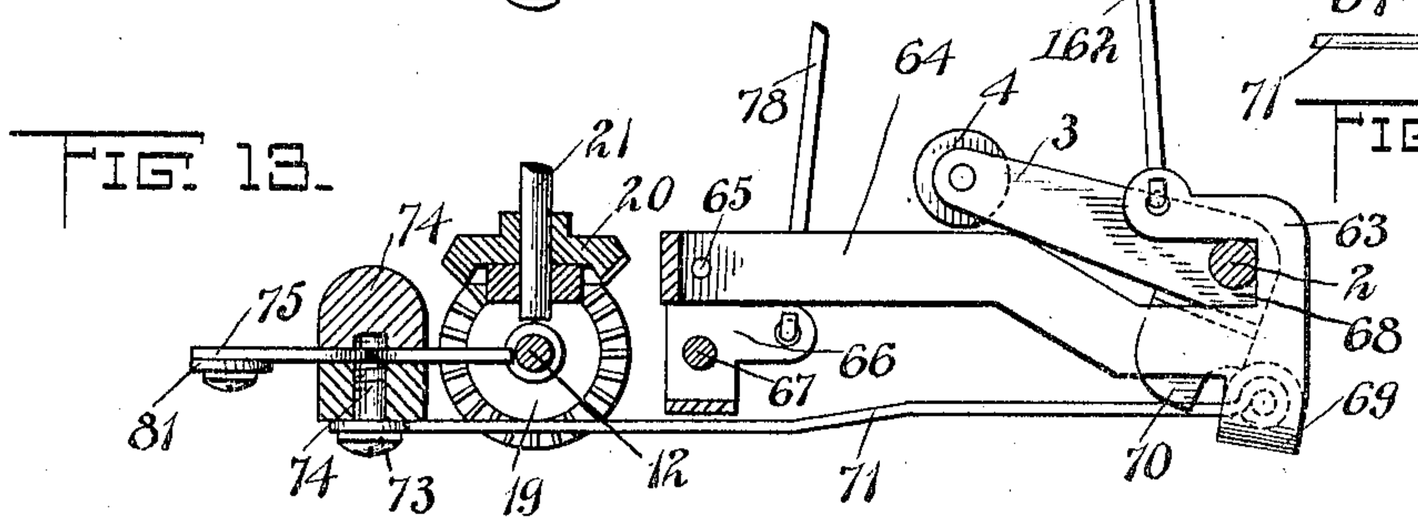



FIG. 14

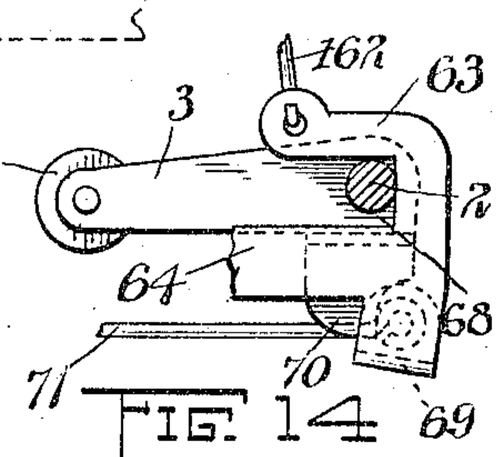



FIG. 8.

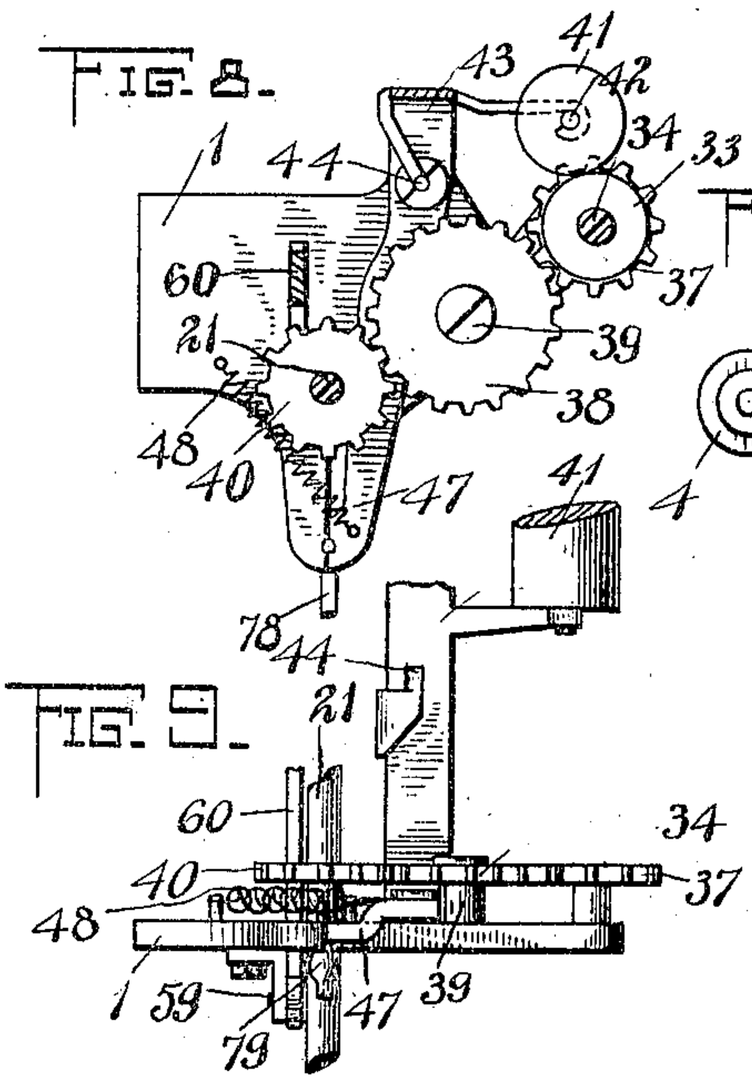



FIG. 9.

FIG. 15.

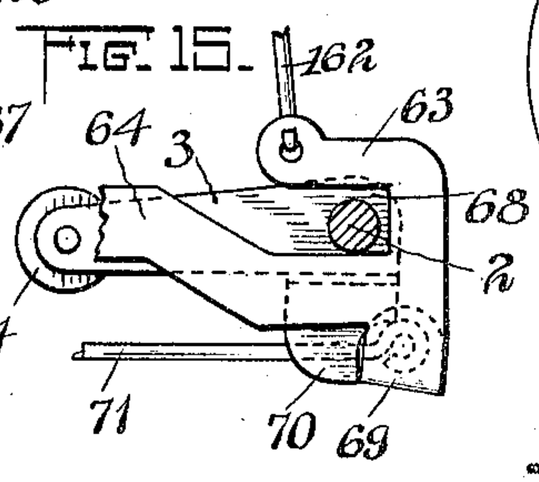



FIG. 10

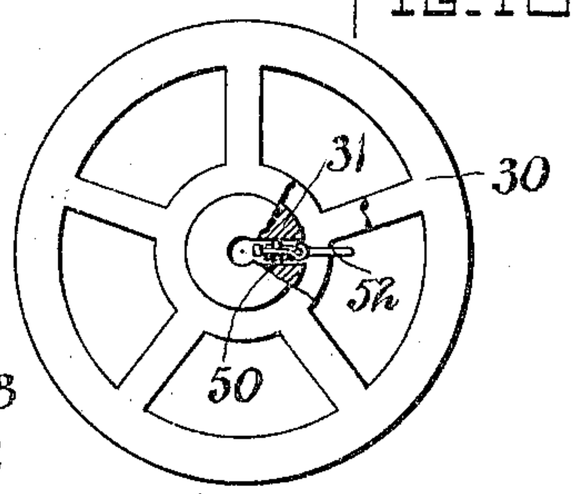



FIG. 11.

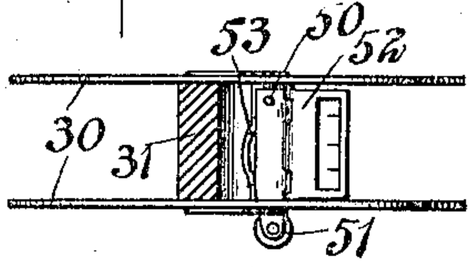
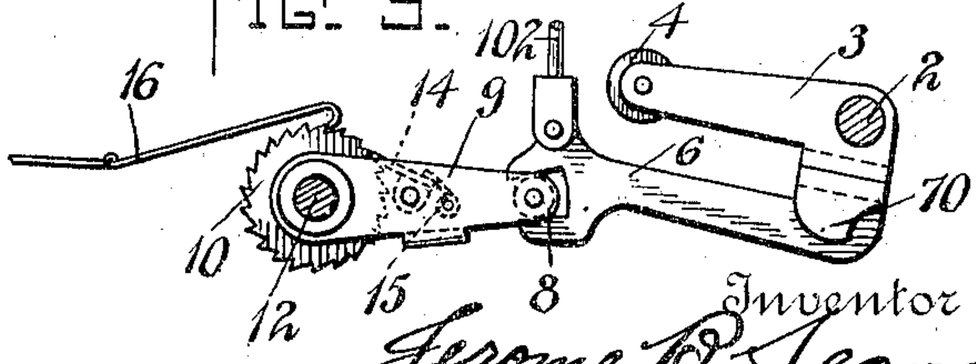



FIG. 5.




Witnesses
S. J. Hopter
William Spanbock

Inventor
Jerome B. Secor
By his Attorneys
Knight Bros

J. B. SECOR.

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8 SHEETS—SHEET 6.

FIG. 16.

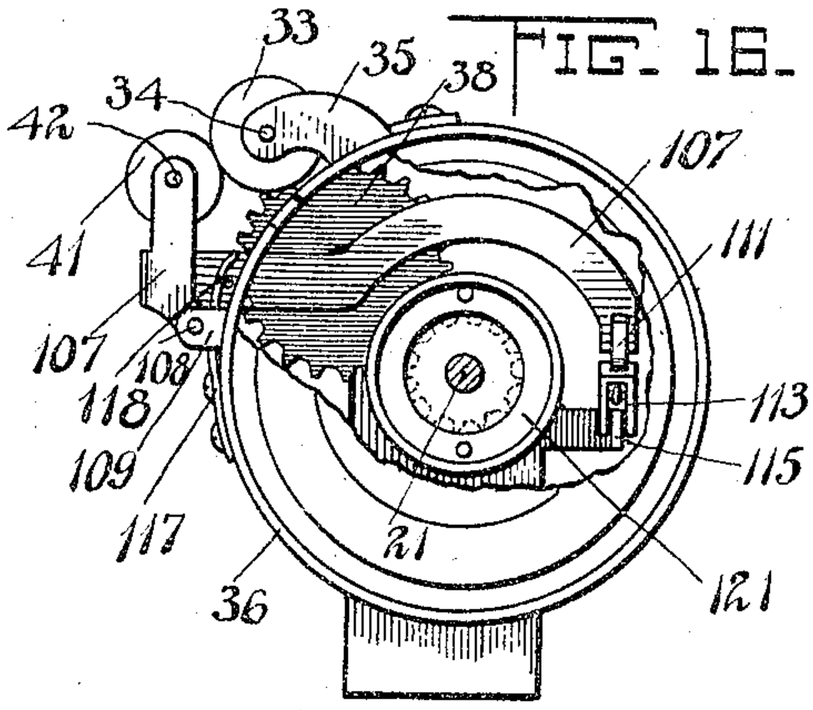



FIG. 18.

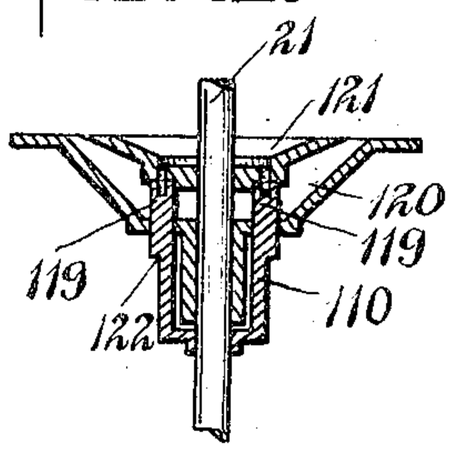



FIG. 17.

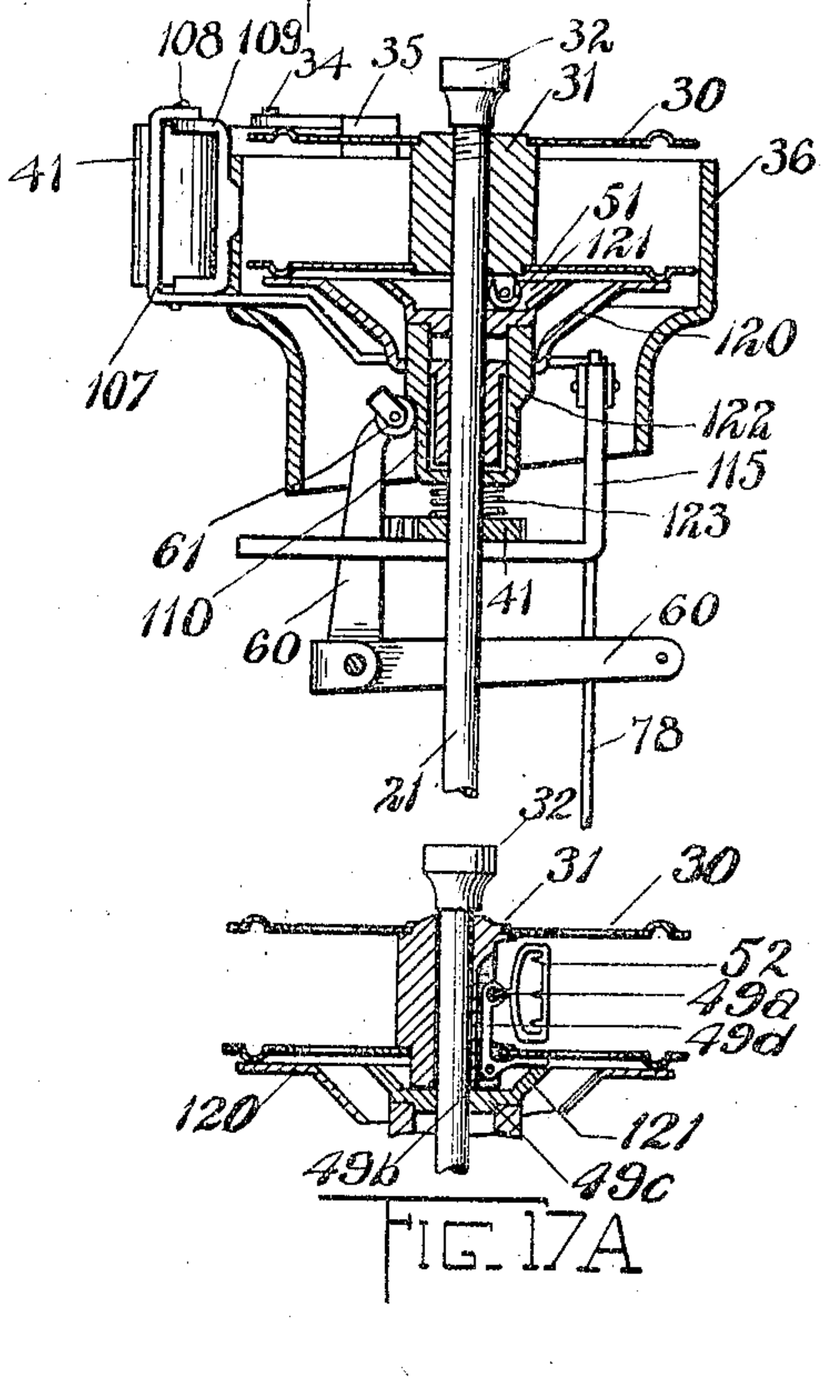



FIG. 17A

FIG. 19

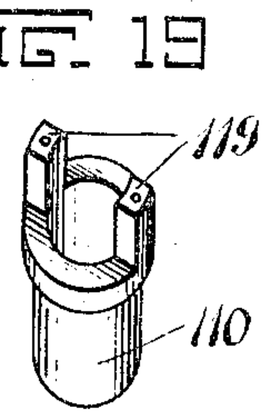
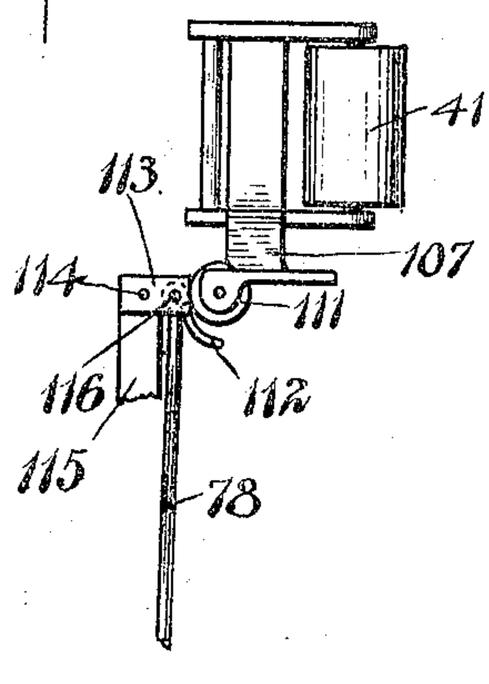



FIG. 20.




Witnesses
S. J. Hoxter
William Spanbock

Inventor
Jerome B. Secor
By his Attorneys
Knight Bros

J. B. SECOR.

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8 SHEETS—SHEET 7.

FIG. 21.

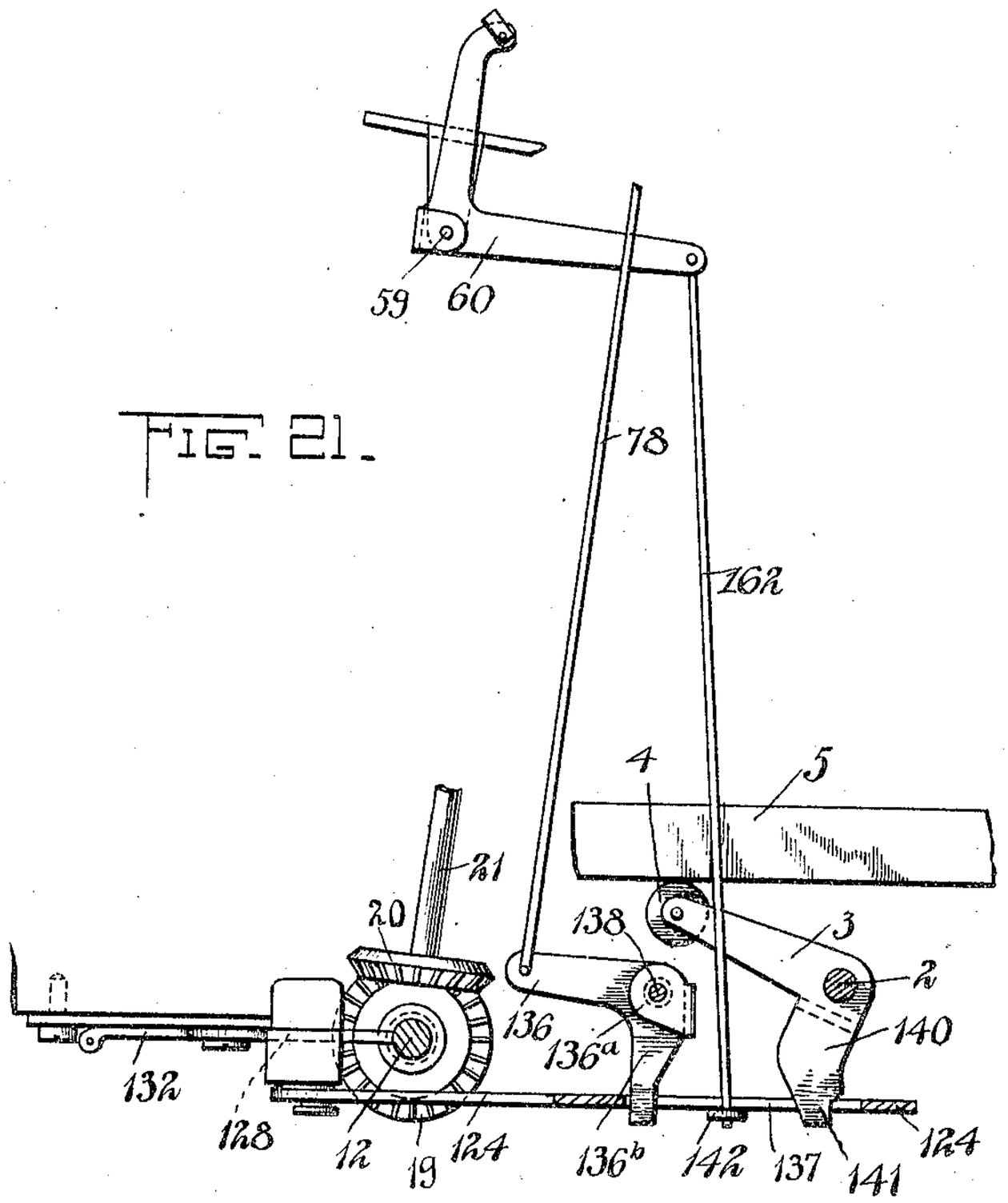
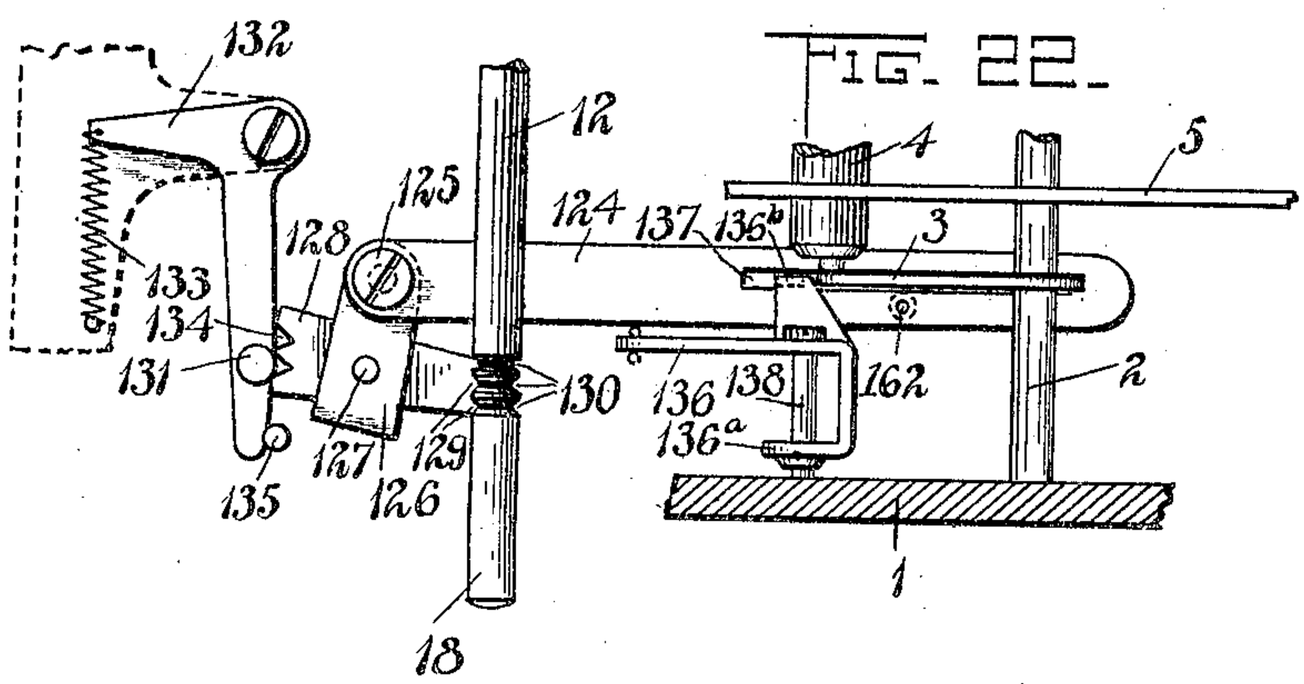



FIG. 22.




Witnesses
S. J. Hoexter
William Spanbock

Inventor
Jerome B. Secor
By his Attorneys
Knight Bros

J. B. SECOR.

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8 SHEETS—SHEET 8.

FIG. 23.

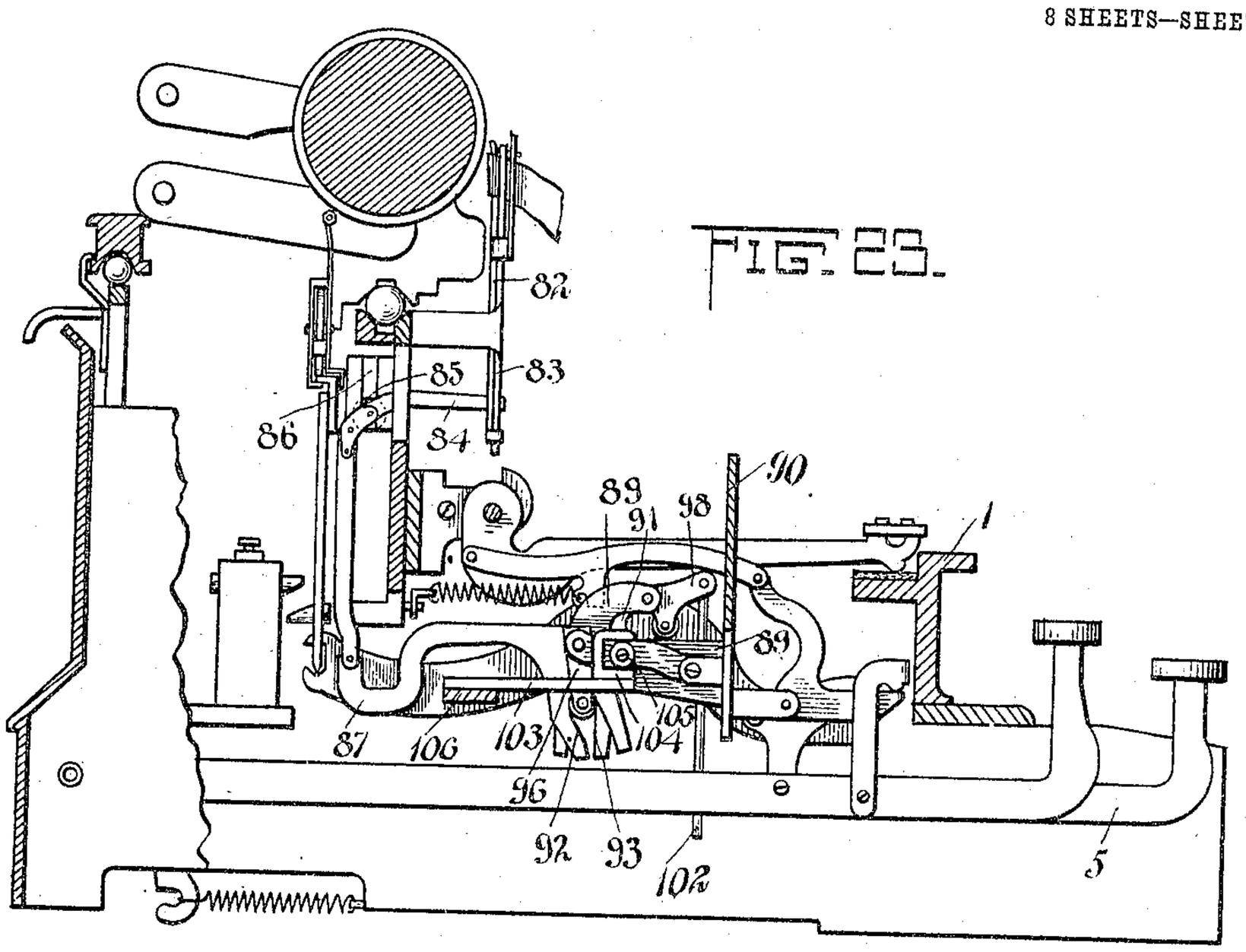
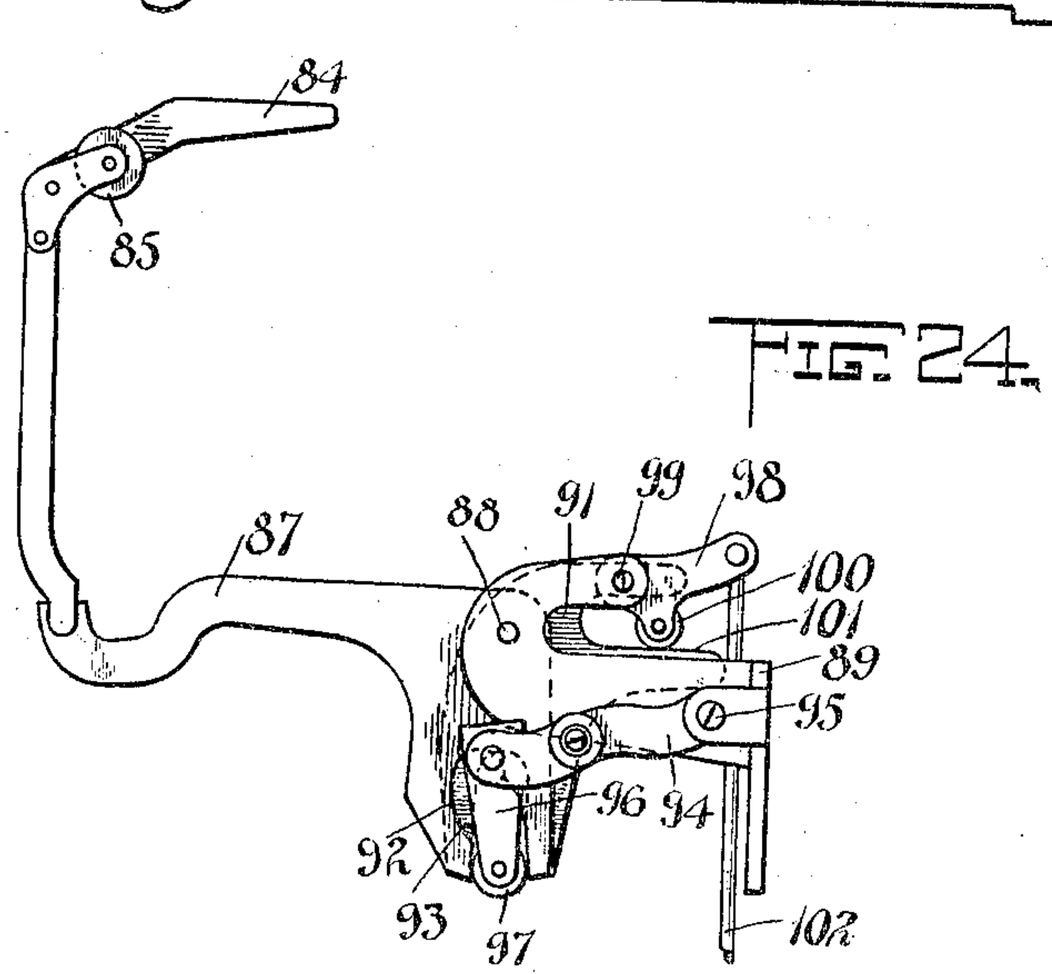



FIG. 24.




Witnesses
S. J. Hoexter
William Spanbock

Inventor
Jerome B. Secor
By his Attorneys
Knight Bros

# UNITED STATES PATENT OFFICE.

JEROME B. SECOR, OF DERBY, CONNECTICUT, ASSIGNOR TO THE WILLIAMS TYPE-WRITER COMPANY, OF DERBY, CONNECTICUT, A CORPORATION OF IOWA.

## RIBBON-FEEDING MECHANISM.

952,281. Specification of Letters Patent. Patented Mar. 15, 1910.

Application filed October 3, 1905, Serial No. 281,173. Renewed August 29, 1908. Serial No. 450,849.

*To all whom it may concern:*

Be it known that I, JEROME B. SECOR, a citizen of the United States, residing at Derby, in the county of New Haven and State of Connecticut, have invented certain new and useful Improvements in Ribbon-Feeding Mechanism, of which the following is a specification.

The object of my present invention is to provide an improved ribbon feeding mechanism for that class of typewriting machines known as front strike machines.

More particularly stated, the object of my present invention is to provide an improved ribbon feeding mechanism in which the ribbon is fed from spool to spool past the printing point at a uniform rate of speed.

A common fault in ribbon feeding mechanism heretofore has been that in order to get a sufficient rate of travel to secure a clear impression when the spool is just starting to wind, it has been necessary to have an average rate of speed much greater than desirable, it being a well known fact that as the bulk of wound ribbon increases the speed of the ribbon increases, so that shifting the direction of feed becomes necessary too frequently resulting in wear on the machine. With my present mechanism this is avoided. I employ means for feeding the ribbon to the spools at a constant rate of speed and in view of the tendency toward increase in ratio of winding speed of ribbon to the circumferential speed of the winding spool, I have provided a compensating spool driving means for the spools so that the spools will at all times wind only so much ribbon as is fed to them by the constant feeding means, regardless of increase of winding capacity incidental to increase bulk of wound ribbon.

A further object of my present invention is to provide an improved automatic ribbon feed reversing mechanism.

Another object of my invention is to provide a ribbon vibrating mechanism which will be operated by the ribbon feeding mechanism.

Further objects of my invention are to provide many improved details of structure hereinafter described and shown in the accompanying drawings, in which like reference characters refer to like parts, and in which—

Figure 1 is a top plan view of my improved ribbon feed mechanism, Fig. 2 is a sectional front elevation, with parts broken away, of the same. Fig. 3 is a sectional side elevation of the same. Fig. 4 is an isometric view of the main shaft actuating mechanism. Fig. 5 is a detail side elevation of a portion of the same. Fig. 6 is an enlarged detail sectional side elevation of one of the ribbon spools, showing the spool mounting and surrounding devices. Fig. 7 is a detail sectional side elevation of the spool and mounting showing parts in shifted position. Fig. 8 is a plan view of the gearing between the spool rotating shafts and the ribbon feeding devices. Fig. 9 is a side elevation of the same. Fig. 10 is a detail plan view of one of the ribbon spools, partly broken away and in section to show spring pressed feed reversing lever and ribbon buckle. Fig. 11 is a transverse section through the same. Fig. 12 is a detail plan view of a portion of the ribbon reversing mechanism showing the means for shifting the main operating shaft. Fig. 13 is a sectional side elevation of the same. Fig. 14 is a detail sectional side elevation of a portion of the same showing positions of parts upon depression of a key bar. Fig. 15 is a like view showing positions of parts upon actuation of the ribbon feed reversing mechanism upon the depression of a key bar. Fig. 16 is a detail plan view of one of the spool supporting disks showing modifications, with the spool removed, showing the housing for the same and the juxtaposed feeding device, and showing the said disk broken away for the purpose of disclosing the feeding roller frame operating lever. Fig. 17 is a transverse section through the same, the spool being in position. Fig. 17[a] is a detail transverse section showing a modified form of feed reversing lever. Fig. 18 is a detail transverse section through said spool supporting disk showing the feed reversing plunger mounted therein. Fig. 19 is a detail perspective view of the plunger removed from said disk, the head of the plunger being removed. Fig. 20 is a detail side elevation of the clamping feed roll of each of the ribbon feed devices, showing its vibratory frame, and showing the pitman for vibrating said frame to separate the feed rollers. Fig. 21 shows a sectional side elevation of slight modifications in the feed reversing mechanism. Fig. 22 is a sectional plan view of a portion of the same. Fig. 23

is a transverse section through a typewriting machine, showing a ribbon vibrating mechanism forming a part of my improved ribbon feed mechanism. Fig. 24 is a detail side elevation of a portion of said mechanism showing the parts in operated position.

*Ribbon feeding mechanism.*—Referring now in detail to the drawings, 1 represents the frame of a typewriting machine having seated therein pivots 2 one at each side of the machine shown on which is pivoted a depressible frame 3 carrying a preferably rotatable universal bar 4 in a position near to or bearing against the under sides of the series of key bars 5. (Figs. 1, 2 and 3.) Frame 3 is provided with an extension or arm 6 which is provided with a notch 7 which engages an antifriction roller 8, (Figs. 1, 4 and 5.) Antifriction roller 8 is mounted at the end of a forked rock arm 9, which straddles a ratchet 10 mounted on a collar 11 connected to the main rotating shaft 12 by a slidable slot and pin connection 13. (Figs. 1 and 4.) 14 is a pawl pivotally mounted on the rock arm 9 and held in engagement with the teeth of the ratchet 10 by means of a spring 15. 16 is a dog suitably mounted on the machine frame 1 and engaging the teeth of the ratchet 10 to prevent reverse movement of same. 17 are return springs connected at one end of the frame 1 of the machine, and at their other end to the depressible frame 3. (Figs. 1 and 3.)

In the structure thus far described, a depression of any one of the key bars 5 to actuate a type bar will depress the universal bar 4, turning the depressible frame 3 upon its pivots 2, carrying down the arm 6, depressing the antifriction roller 8 and drawing the pawl 9 over the teeth of the ratchet 10. As the key 5 rises after the type bar has left the printing point, the frame 3 rises under the influence of the springs 17, carrying the antifriction roller 8 upwardly and the pawl 14 being held in engagement with the teeth of the ratchet 10 by its spring 15, rotating said ratchet, which, in turn, through the collar 11 and slot and pin connection 13 rotates the shaft 12. Shaft 12 is slidably, as well as rotatably mounted in the machine frame 1 and is provided with a handle or handles 18 which projects, or project, beyond the machine frame 1 for the purpose of slidably moving the shaft 12 by the hand of the operator. (Figs. 1, 2 and 12.) At either side of the machine, on shaft 12, is mounted a bevel gear 19, said gears 19 being oppositely faced, and adapted alternately to be thrown into engagement with bevel gears 20 on substantially vertical spool shafts 21 at either side of the machine to rotate either one or the other of said shafts 21. (Fig. 4). Gears 19 are so positioned upon shaft 12 that but one of said gears 19 can be in engagement with its gear 20 at a time. Shafts 21 are positioned a little forward of the perpendicular to give a proper feed slant to the spools at the printing point. Shafts 21 are rotatably mounted in bearings 22 forming a part of the machine frame. At the upper end of each of the shafts 21 is a collar 23 pinned at 24 to the shaft 21 to turn therewith and provided at its upper end with a socket 25 to receive the tubular shank 26 of the friction disk 27. The shank 26 fits over the shaft 21 and is pinned thereto at 28, so that the same turns with said shaft. (Fig. 6.) The disk 27 is cup shaped having annular bearing flanges 29 upon which rest the spool 30 which is provided with a tubular hub 31 fitting over the shaft 21 and retained thereon by a set screw or cap 32. Upon rotation of the shaft 12, rotary movement is imparted to either one of the shafts 21 depending upon which of the gears 20 is in engagement with its gear 19. Rotation of either of the shafts 21 will rotate its collar 23, and through shank 26 and disk 27 the spool 30, positioned upon the disk 27, will be rotated to wind the ribbon on said spool.

As stated, as the bulk of wound ribbon increases in diameter on the winding spool increasing the circumference of the wound ribbon, it is obvious that the drawing tendency of the winding spool will increase, so that during the last half of the feed of the ribbon it will be drawn past the printing point at a greater rate of speed than throughout the first half of the ribbon feed. To obviate this objectionable feature, I have mounted the spools 30 upon the friction disks 27 and have provided a regular, positive feeding device mounted in juxtaposition to each of the spools so that a regular amount of ribbon is fed to the winding spool upon each actuation of a type bar which amount of ribbon is taken up by such winding spool. When the winding tendency of the winding spool increases beyond the feeding capacity of the positive feeding device, the spool will be retarded and will then slip upon its friction disk 27 of flanges 29 thereof, thus compensating for the increased feeding tendency. Such a positive, regular feeding device comprises a pair of feeding rollers one mounted, preferably adjacent to each of the feeding spools, one of said rollers 33 being rigidly mounted upon a rotating spindle 34. (Figs. 1 and 2.) Spindle 34 is rotatably mounted, at its lower end, as shown in Figs. 3, 6 and 7, in an inclined plate $1^a$, fixed in the machine frame 1, and at its upper end in a bracket 35 forming a part of the spool housing 36. Spindle 34 carries a pinion 37 at or near its lower end which meshes with a pinion 38 mounted on a stud rigidly mounted in the machine frame. The pinion 38 on the stud 39 in turn meshes with a pinion 40, which is rig-

idly mounted on the sleeve 23, to rotate with said sleeve 23 and the shaft 21. (Fig. 6).

Upon rotation of the shaft 21 and the sleeve 23, the pinion 40 on said sleeve 23 will rotate the pinion 38 on the stud 39, which, in turn, will rotate the pinion 37 on the spindle 34. The shaft 21 rotates at a positive and regular rate of speed, and, since the gearing between the shaft 21 and the spindle 34 is a positive gearing, said spindle 34 and the roller 33 will be rotated at a regular rate of speed.

In order to create the necessary pull on the ribbon during the feeding operation a second roller 41 is rotatably mounted on pin 42 carried by a vibratory frame 43. Frame 43 is pivoted at 44 by means of an arm on said frame to the housing 36 and at 45 on a stud 46 seated in the machine frame so that said frame can be vibrated to carry the roller 41 into or out of engagement with the roller 33. At its lower end, the frame 43 is bent and extended to form a vibrating lever 47. 48 is a spring, one end of which is connected to the free end of the lever 47, the other end being connected to the machine frame and which acts upon the lever 47 to turn the frame 43 on its pivots 44, 45 to hold the roller 41 normally in engagement with the roller 33. The ribbon extends from spool to spool through the pairs of feeding rollers at each side of the machine adjacent each spool and through the frisket at the printing point. But one of the pair of rollers 33, 41 are in clamping engagement at a time through means hereinafter described and that pair of rollers is the pair which is adjacent the winding spool.

*Automatic feed reversing mechanism.*— In connection with the foregoing positive and regular feeding mechanism, I have provided a means for automatically reversing the ribbon feed and for releasing the clamping engagement between the rollers 33, 41 which have just completed the feed of the ribbon to the winding spool. Such mechanism is thrown into operation by either spool when empty. For this purpose, each of the spools is provided with a recessed hub 31 in the recess of which is located a lever 49 pivoted at 50 carrying at its lower end an antifriction roller 51. (Fig. 6). Lever 49 has a buckle 52 attached thereto, to which the end of the ribbon is secured. Lever 49 is operated by a spring 53 secured to the lever 49 and bearing against the shaft 21 or hub 31. Spring 53 is held compressed as long as there is any wound ribbon upon the spool 30, but when the spool becomes empty the lever 49 is forced outwardly by the spring 53. Positioned within the disk 29 is a cup shaped plunger head 54, on the bevel face of which the antifriction roller 51 bears. The plunger head 54 is connected through means of links 55 with the plunger proper 56 positioned beneath the disk 27 and which is tubular and slidably mounted upon the collar 23. Links 55 pass through suitable perforations in the bottom of the disk 27 and are seated in the upper end of the plunger proper 56. The plunger proper 56 and plunger head 54 rotate with the disk 29 through means of the link connection 55 therewith. The plunger head 54 and the plunger proper 56 are held normally in elevated position to maintain the plunger head 54 against the antifriction roller 51 by a coil spring 57. The spring 57 bears at its lower end upon the pinion 40 mounted on the collar 23 and at its upper end against an annular enlargement or flange 58 upon the plunger proper 56. When the spool 30 becomes empty of ribbon, the lever 49 is forced out by the spring 53, forcing the antifriction roller 51 against the bevel face of the plunger head 54 causing a vertical displacement of the plunger head 54 and the plunger proper 56 in opposition to the spring 57.

Mounted on the machine frame 1 at 59 is a bell crank lever 60 carrying at its upper end an antifriction roller 61 which bears against the surface of the plunger proper 56.

62 is an annular cam surface on the plunger proper 56, which, when the plunger head 54 and said plunger proper 56 are vertically displaced, engages the antifriction roller 61, displacing said roller horizontally and elevating the lower end of the bell crank lever 60. (Fig. 7.) 162 is a link connected at its upper end to the lower arm of bell crank 60, and at its lower end to the arm 63 of the shift plate 64. (Fig. 3.) Plate 64 is pivoted at 65 to a U-shaped frame 66, which is pivotally mounted at 67. The plate 64 is capable of vertical rocking movement and the frame 66 is capable of horizontal rocking movement. The arm 63 is so positioned on the plate 64 as to form with said plate 64 a recess 68 through which the pivot 2 of the depressible frame 3 extends. The recess 68 is of sufficient width to permit of a limited vertical movement of the plate 64. When the bell crank 60 and link 162 are in their lowermost positions the under edge of the arm 63 rests against the pivot 2 of the frame 3. The plate 64 is provided with a transverse lug or projection 69 which projects into the vertical plane of a kick out or projection 70 on the frame 3.

When the bell crank is elevated or operated by the plunger proper 56, elevating the lower end of the bell crank and link 162, the plate 64 is oscillated vertically to bring its lug or projection 69 into the same horizontal plane with the "kickout" or projection 70 on the depressible frame 3. (See Fig. 15.) At such time the upper edge of the plate 64, within recess 68, rests against the pivot 2.

Upon the next depression of the frame 3 by the key bar 5, the kick out or projection 70 will engage the lug or projection 69 on the plate 64 and displace the plate 64 longitudinally, the U-shaped frame 66 vibrating horizontally to compensate such displacement.

71 is a link connected at one end to the lug or projection 69 (Fig. 4) and at its other end to the lever 72 which is rigidly mounted on a pin 73 seated in a bracket 74 Figs. 12 and 13. At its upper end the pin 73 carries a double lever 75, one arm of which engages through means of teeth 76 with grooves 77 on the shaft 12. When the link 71 is pulled forward through engagement with the lug 69 by the kick out or projection 70, the lever 72 is pulled forward, turning the pin 73, and the double lever 75 to move the shaft 12 longitudinally and carry the gear 19 on the shaft 12 into engagement with its gear 20. It will thus be seen when the unwinding spool becomes empty, the lever 53 will be actuated to depress the plunger head 54, plunger 56, elevate the bell crank lever 60, the link 162 elevating the plate 64 until the upper edge of the plate 64 within the recess 68 engages the pivot 2 in which position the lug or projection 69 is in the path of the kick out or projection 70, when, upon the next depression of the depressible frame 3 by the key bar 5 the plate 64 is moved longitudinally in the manner before described, turning the U-shaped frame 66 on its pivot 67 and drawing the link 71 to throw the gear 19 on the same side of the machine as the empty spool into engagement with the gear 20, which operates that spool, whereupon the empty spool will immediately begin to wind the ribbon.

For the purpose of throwing the feeding roller into and out of engagement when the spool adjacent thereto is feeding or unwinding, respectively, a cam rod 78 (Figs. 1 to 4) is provided, which is located at its upper end between the vibrating lever 47 and the frame 1 of the machine. The cam rod 78 is provided with a cam 79 at or near its upper end, which, when the rod 78 is moved to its uppermost position, wedges between the vibrating lever 47 and the frame 1 to vibrate the lever 47 and carry the roller 41 out of engagement with the roller 33, thus permitting the ribbon to pass between the rollers 33, 41, freely upon the unwinding of the spool 30. The cam rod 78 at its lower end is connected with an arm 80 on the U-shaped frame 66, which is in a horizontal position when the spool 30 is unwinding, thus holding the rod 78 in elevated position, and hence holding the vibrating lever 47 apart from the frame 1 and the rollers 33, 41 away from each other. When the ribbon becomes unwound on a spool 30, as before described, the lever 49 is actuated by its spring 53 to elevate the plate 64 into the path of the kickout 70, whereupon the plate 64 is longitudinally displaced upon the next actuation of a key bar in a manner already described, rocking the U-shaped frame 66 on its pivot 67, thus depressing the arm 80 and frame 66. When the arm 80 is depressed it draws the bar 78 downward and the cam 79 from between the vibrating lever 47 and the frame 1, thus allowing the rollers 33, 41 to come together under influence of spring 48, whereupon the feed of the ribbon to the empty spool is commenced and continued in the manner already described.

With the mechanism thus far described, the spool rotating shafts, the friction disks, the spools, the regular feeding rollers or devices adjacent thereto, the automatic reversing mechanism, and the means for separating the feeding rollers, are all duplicated, that is, one set of devices on either side of the machine, that is, each spool has its own train of mechanism adapted to be driven by the main driving shaft 12. All of the parts being connected together in the manner before described, it will be obvious that upon shifting of the shaft 12, either by the handle 18 or by the automatic means described, the parts on the two sides of the machine will be oppositely operated so that upon movement of the two feeding rollers 33, 41, on one side of the machine into engagement, the rollers 33, 41 on the opposite side of the machine will be moved out of engagement, and, upon movement of a gear 19 on one side of the machine into engagement with its gear 20 on the spool rotating shaft 21, the gear 19 on the opposite side of the machine will be moved out of engagement with its gear 20 on its spool rotating shaft 21.

While the shaft 12 is a sufficient means for insuring the reversing of all the parts, and a movement of all in unison, I have provided a link 81 connecting the two levers 75 at the arms of said levers 75 opposite the teeth 76. (Fig. 4).

*The ribbon movement mechanism.*—In order to move the ribbon to the printing point upon each actuation of a typebar (Figs. 23 and 24), the usual frisket 82 is provided, carrying the ribbon at its upper end and slidably mounted upon an alining plate 83, or other part of the machine, and having at its lower end a pitman 84 carrying an antifriction roller 85 traveling in a guide way 86. Pitman 84 is angular and extends downwardly and is connected by its arm to a pitman actuating lever 87 pivoted at 88 to a bracket 89 positioned on a cross plate 90 extending transverse the machine. Overlapping the lever 87 and pivoted also at 88 in the bracket 89 is a second lever 91. Lever 87 is provided with a recess 92 disposed at an angle and partially registering with a vertical recess 93 in the lever 91.

94 is a U-shaped frame pivoted to the

bracket 89, at 95, pivotally carrying at its free end an arm 96 which extends downwardly and carries at its free end an antifriction roller 97. Roller 97 projects to one side of the arm 96 and engages the recesses 92, 93.

98 is a bell crank lever pivoted at 99 to an arm of the bracket 89 and carrying an antifriction roller 100, traveling in a recess 101 in the lever 91.

102 is a link connecting the long arm of the bell crank lever 98 with the arm 6 on the depressible frame 3. (Figs. 4 and 24). Upon each depression of the frame 3 by a key lever 5, the link 102, through means of the frame 6, is drawn downwardly and through the bell crank lever 98 and the roller 100 operates the lever 91 to force the antifriction roller 97, which is in engagement with the walls of the recess 93, against the walls of the recess 92 to move the lever 87 and elevate the pitman 84 and the frisket 82. In this way, the ribbon is elevated to the printing point at each actuation of a type bar. Since the platen is shifted through any suitable platen shift mechanism so that the type, when actuated, will strike in the upper case, it is desirable to shift the ribbon a proportionate distance to an advanced initial point in order that the upper case type will strike the same. For this purpose, the antifriction roller 97 provides a connection between the levers 87 and 91 which is mounted between the depressible U-shaped frame 94 and for the same purpose the recess 92 is diagonal of the line of the recess 93, (Figs. 23 and 24), so that when the pin is depressed vertically against the surface of the recess 92, the lever 87 will be displaced, the vertical recess 93 preventing transverse movement of the antifriction roller 97 and the lever 91 being held against reverse movement by the link 102 and the depressible frame connected thereto, so that it will be seen that the lever 87 must give way, and hence elevate the pitman 84 and frisket 82. Frame 94 is designed for shifting frisket 82 upon actuation of either of the shift keys.

For the purpose of depressing the U-shaped frame 94 any suitable means may be employed, such, for instance, as the bar or arm 103 having a forked forward end engaging an antifriction roller 105 on the U-shaped frame 94. The bar or arm 103 in this case extends from a frame 106 mounted (not here shown as mounted) on the platen shift mechanism (not here shown). Upon actuation of the platen shift mechanism (not shown) the frame 106 will be carried downwardly, carrying with it the frame 103, and with it the forked end 104, which, being in engagement with the antifriction roller 105, will depress the U-shaped frame 94 and the antifriction roller 97 to move the lever 87, and elevate the frisket 82 in the manner already described. It will thus be seen that upon each actuation of the type bar or of the shift keys the ribbon is moved to the printing point. Upon actuation of a shift key, the ribbon is moved to an advanced initial point and then upon actuation of a key bar the ribbon is moved to the printing point beyond such advanced initial point.

I have now described completely my improved mechanism, and I will now call attention to several modifications of structure which may be advantageously employed, but I wish it to be clearly understood that the same are mere instances of the many modifications which may be employed without departing from the spirit of my invention. For instance, I may employ a frame 107 pivotally mounted at 108 to a bracket 109. (Fig. 16). Frame 107 extends downwardly and is curved to avoid the plunger proper 110, which is also slightly modified as will be later described and carries at its free end an antifriction roller 111. Antifriction roller 111 is engaged by a cam 112 (Fig. 20) rigidly mounted on a U-shaped frame 113 pivoted at 114 to a rigid support 115 suitably mounted on the machine frame. The U-shaped frame 115 is pivotally connected at 116 to the link 78, connected as before described to the arm of the frame 66. 117 is a spring mounted on the side of the spool housing 36 and engaging a pin or projection 118 on the lever 107, so that the normal tendency of the lever 107 is to throw the antifriction roller 41 into engagement with the surface of the antifriction roller 33. When the frame 66 is in its upright or vertical position, which is the case when the spool on this side of the machine located directly above it is unwinding, the link 78 is in elevated position, in which case the cam 112 holds the antifriction roller 111 away from the support 115, in which position the feeding rollers 33, 41 are separated. It is, of course, obvious that when frame 66 is tilted when the link 78 is in its lowermost position the rollers 33, 41 will be forced into contact by the spring 118, so that said rollers will grip the ribbon and feed it toward the adjacent spool.

In Figs. 16, 17 and 18, a plunger proper 110 is constructed differently from the plunger proper 56, shown in Figs. 3 and 6. This plunger proper 110 is tubular in form and provided with a pair of posts 119 which project through the friction disk 120, similar in construction to the friction disk 27 to support the plunger head 121 similar in construction to the plunger head 54. The plunger proper is of less diameter at its lower exterior portion, forming an annular shoulder or cam surface 122 adapted to actuate the lever 60 through engagement of the antifriction roller 61 in the manner already described to elevate the plate 64. In this

instance, a spring 123 bears against the base of the plunger proper 110 to hold the same normally in elevated position to keep the plunger head in contact with the antifriction roller 51. If desired a bell crank lever 49ª (Fig. 17ª) may be employed which is pivoted at 49ᵇ to the hub 31 and which carries on its long arm 49ᶜ the buckle 52. The short arm 49ᵈ of lever 49ª bears against plunger head 121. When the spool becomes empty the long arm 49ᶜ of lever 49ª is pulled out forcing the short arm 49ᵈ, against head 121.

The operation of the modified form of plunger mechanism is identical with the form shown in Figs. 2 and 4, and hence needs no further description.

In Figs. 21 and 22, I have shown slight modifications in the means for shifting the shaft 12, which is far simpler than the means thus far described. Therein a plate or bar 124 is pivoted at 125 to an arm 126, which is rigid on a pivot 127 of the lever 128. Lever 128 is provided at one end with teeth 129, which engage teeth 130 on the shaft 12. In this instance, the link connecting the two mechanisms one on each side of the machine, is dispensed with and a dog 131, mounted on a bell crank 132, controlled by a spring 133 is utilized to hold the parts in either of their shifted positions. The dog 131 engages teeth 134 in the lever 128. 135 is a stop against which the bell crank 132 abuts to prevent locking of the lever 128 against movement by the handle 118 or by the feed-reversing mechanism, that is, dog 131 is intended only to lock the lever 128 against unintended movement by jarring of the machine or the like.

In this modified form of reversing mechanism the rod 78 which operates the two separate feed rollers 33, 41 is connected at its lower end to a bell crank lever 136 having an extended bearing portion 136ª, by means of which and the main portion of the lever 136, said lever is mounted on a pivot 138. The extended bearing portion 136ª prevents wabbling or sidewise vibration of the lever 136. The pivot 138 is mounted in the side of the machine frame 1. The lower arm 136ᵇ of the lever 136 extends downwardly and engages the end of the slot 137 in the plate 124 or is locked in said slot 137 near the end thereof. The depressible frame 3 in this form of reversing mechanism is provided with a kick out 140 having a projection 141 thereon. The kick out 140 is also located in the slot 137. The link 162 has at its lower end a nut 142 upon which the plate 124 rests. The plate 124 rests upon and is supported by the nut 142 so that upon elevation of the link 62 through means of the bell crank lever 60, the plate 124 is drawn upwardly to bring the same into the plane of projection or shoulder 141 of the depressible frame 3. In this position, a depression of any of the key bars 5 will depress the frame 3 as usual throwing the shoulder 141 on the kick out 140 against the end of the slot 137 to displace the plate 124 longitudinally, turn the arm 126 of the lever 128 to shift the shaft 12 to bring the gear 19 on that side of the machine into engagement with its gear 20. At the same time movement of the plate 124 through one end of the slot 137 will turn the bell crank 136 from the lower arm 136ᵇ, lower the link 78 and allowing the two rollers 33, 41 to be brought together by their spring in manner already described.

Having thus described my invention, the following is what I claim as new therein, and desire to secure by Letters Patent:

1. In a ribbon feed mechanism for writing machines, the combination with a ribbon spool; of yielding frictional means for rotating said spool, and means actuated by said spool rotating means for feeding a constant amount of ribbon to said spool.

2. In a ribbon feed mechanism for writing machines, the combination with a ribbon spool, a shaft for rotating said spool, and a friction driving connection between said shaft and spool, of means actuated by said shaft for feeding a constant amount of ribbon to said spool.

3. In a ribbon feed mechanism for writing machines, the combination with a ribbon spool, a shaft for rotating said spool, and friction driving connection between said shaft and spool; of means actuated by said shaft for feeding a constant amount of ribbon to said spool, and means for throwing said feeding means out of operation upon reversal of said shaft.

4. In a ribbon feeding mechanism for writing machines, the combination of a ribbon winding device; of means for rotating said winding device, and a frictional connection between said rotating means and said device, and means for feeding a constant amount of ribbon to said winding device upon each actuation of a keybar.

5. In a ribbon feed mechanism for writing machines, the combination with a pair of ribbon winding devices, means for driving said winding devices, and frictional connection between said driving means and said winding devices, and means for feeding a constant amount of ribbon to each of said winding devices; of means carried by each of said winding devices operative when each device is empty for reversing the direction of operation of the other winding device and for throwing the constant feeding means of said other winding device out of operation.

6. In a ribbon feed mechanism for writing machines, the combination with two alternate ribbon winding and unwinding de-

vices; of means for operating said devices, and means for alternately feeding a constant amount of ribbon to said devices, and means carried by each of said devices operative upon the emptying of its respective device for reversing the said constant feeding means and said winding devices.

7. In a ribbon feed mechanism for writing machines, the combination with a pair of alternate winding and unwinding ribbon spools, means for feeding a constant amount of ribbon to each of said spools alternately, means carried by each of said spools operated when its respective spool becomes empty for reversing said constant feeding means and the direction of movement of both of said devices.

8. In a ribbon feed mechanism for writing machines, the combination with a pair of ribbon spools; of shafts and frictional connection between said shafts and spools for rotating the latter, key actuated means for alternately rotating said shafts, and means carried by each spool operating when its spool becomes empty to reverse said shaft operating means.

9. In a ribbon feeding mechanism for writing machines, the combination with a pair of spools and shafts for rotating said spools with a frictional driving connection between said shafts and spools, of a constant ribbon feeding means for each of said spools operative alternately, and devices carried by each spool operated when their respective spools become empty for reversing the feed and throwing out of operation the constant feeding means for said spool.

10. In a ribbon feed mechanism for writing machines, the combination with a ribbon spool, a shaft for driving said spool and frictional driving connection between said shaft and spool, of a pair of rollers adapted to feed a constant amount of ribbon to said spool, and means for rotating said rollers.

11. In a ribbon feed mechanism for writing machines, the combination with a spool, a shaft for driving said spool, and frictional driving connection between said shaft and spool, of a pair of rollers for feeding a constant amount of ribbon to said spool and geared to said shaft.

12. In a ribbon feeding mechanism for writing machines, the combination with a ribbon winding device, a shaft for driving said device and frictional driving connection between said shaft and device, of a pair of rollers geared to said shaft for feeding ribbon to said device.

13. In a writing machine, the combination with a ribbon-spool, a driving shaft on which it is mounted, and a main shaft shiftable into and out of gear with said spool shaft, of a lever mounted in a recess in the core of said spool and normally retracted in inoperative position by ribbon wound on the spool, a spring operating to project said lever, when the spool is depleted, a spring pressed plunger having an annular cam surface traveling upon the free end of the lever so as to depress said plunger when the lever is projected on the depletion of the spool, a cam device carried by said plunger, and a lever and connections actuated by said cam device and operating to shift the main shaft into gear with said spool-shaft when the spool thereon is depleted.

14. In a writing machine, the combination with the ribbon spool and spool driving means, of frictional driving connections between said driving means and spools, a pair of rollers, positively driven by said driving means, a spring actuated lever mounted on said spool and held normally in inoperative position by the ribbon on said spool, a plunger actuated by said lever when the spool becomes empty, and means actuated by said plunger for throwing said spool driving means into operation.

15. In a writing machine, the combination with a ribbon spool, and a spool driving means frictionally connected to said spool, of a pair of separable rollers driven by said spool driving means, and means operative when the spool becomes full for throwing the spool driving means out of operation and separating said rollers.

16. In a writing machine, the combination with a ribbon spool, of a pair of separable clamping and feed rollers, means for driving said spool and rollers, and means operative when the spool becomes full for throwing the spool driving means out of operation, and separating said rollers.

17. In a writing machine, the combination with a ribbon spool, of means for frictionally driving said spool, a feed roller, a clamping roller movable into and out of engagement with said feed roller, suitable gearing between said feed roller and said driving means, and means for throwing said spool driving means out of operation and moving said clamping roller out of engagement when the spool becomes full of wound ribbon.

18. In a writing machine, the combination with a spool, of means for frictionally driving said spool, a feed roller geared to said spool driving mechanism, and a clamping roller movable into and out of engagement with said feed roller, and means for throwing said driving means into operation, and throwing said clamping roller into engagement with said feed roller when the spool becomes empty.

19. In a writing machine, the combination with a spool, of means for frictionally driving said spool, and a feed roller geared to said spool driving means, a clamping roller movable into and out of engagement with

said feed roller, and means for throwing said spool driving means into and out of operation, and for moving said clamping roller into and out of engagement with said feed roller.

20. In a writing machine, the combination of a pair of spools, means for frictionally driving said spools, a feed roller for each spool driven at a constant rate of speed, and a clamping roller movable into and out of engagement with each feed roller, and means for throwing the spool driving means into and out of operation, and for moving the clamping rollers into and out of engagement.

21. In a writing machine, the combination of a pair of spools, means for frictionally driving said spool, a feed roller for each spool driven at a constant rate of speed, and a clamping roller movable into and out of engagement with each feed roller, and means carried by each spool operative when a spool becomes empty for throwing the spool driving means to operate said spool for moving its clamping roller into engagement, and for moving the clamping roller of the other spool out of engagement.

22. In a writing machine, the combination with ribbon spools, and a shiftable shaft for rotating said spools, of a key-lever-actuated depressible frame and means actuated thereby for actuating said shaft, a lever for shifting said shaft, a link connected to said lever, a shifting frame connected to said link, means carried by said depressible frame for actuating said shiftable frame when in line of engagement, and means carried by the spool for bringing said shiftable frame into line with said operating mechanism on the depressible frame.

23. The combination of the spool shaft 21, main shaft 12 shiftable into and out of engagement therewith, means for rotating the main shaft step by step by depression of a key lever, lever 72 for shifting the main shaft, shift plate 64, link 71 connecting the shift plate 64 and lever 72 and means for actuating the shift plate 64 when the spool is depleted, substantially as described.

24. In a writing machine, the combination with the spools, shafts for driving said spools, a shiftable main shaft for driving said spool driving shafts alternately, means for rotating said main shaft, a lever for shifting said main shaft, a link connected to the lever, a shifting frame connected to said link normally in inoperative position, means for operating said frame when in operative position to shift said shaft, and means operative upon the emptying of a spool to move said frame into operative position.

25. In a writing machine, the combination with ribbon spools, of spool driving shafts and a shiftable main driving shaft therefor, a feed roller means for driving said feed roller, a clamping roller movable into and out of engagement with said feed roller, a lever for shifting said main driving shaft, a frame normally in inoperative position for operating said lever, and suitable connections between said lever and frame, means connected to said frame for holding said clamping roller out of engagement with said feed roller, means for moving said frame into operative position, and means for operating said frame when in operative position, and to shift said frame and allow the clamping roller to engage said feed roller.

26. In a ribbon elevating mechanism for typewriting machines, the combination of a vertically shifting platen and shifting mechanism therefor, a vertically sliding and guided frisket by which the ribbon is carried to the printing point, a pitman having vertical and horizontal arms, the latter connected to the frisket to operate it, a pair of bell crank levers formed with an oblique recess between them, a shiftable bearing in said oblique recess to transmit variable movement from one lever to the other, key bar operated means connected with the first lever to transmit movement thereto and through the medium of the interposed bearing and second lever and pitman to the frisket and a connection between the platen shift mechanism and the shiftable bearing to effect correspondingly increased movement of the ribbon frisket, when the platen is elevated, substantially as described.

27. In a ribbon feed mechanism, the combination of means for frictionally driving the ribbon spools with means for regulating the rotation of said ribbon spools, said means comprising an oscillatory clamping means and a rotary member both in juxtaposition to said ribbon spools, said regulating means actuated by the spool driving means, substantially as described.

JEROME B. SECOR.

Witnesses:
J. P. CLARKE,
M. A. KRUPPER.