

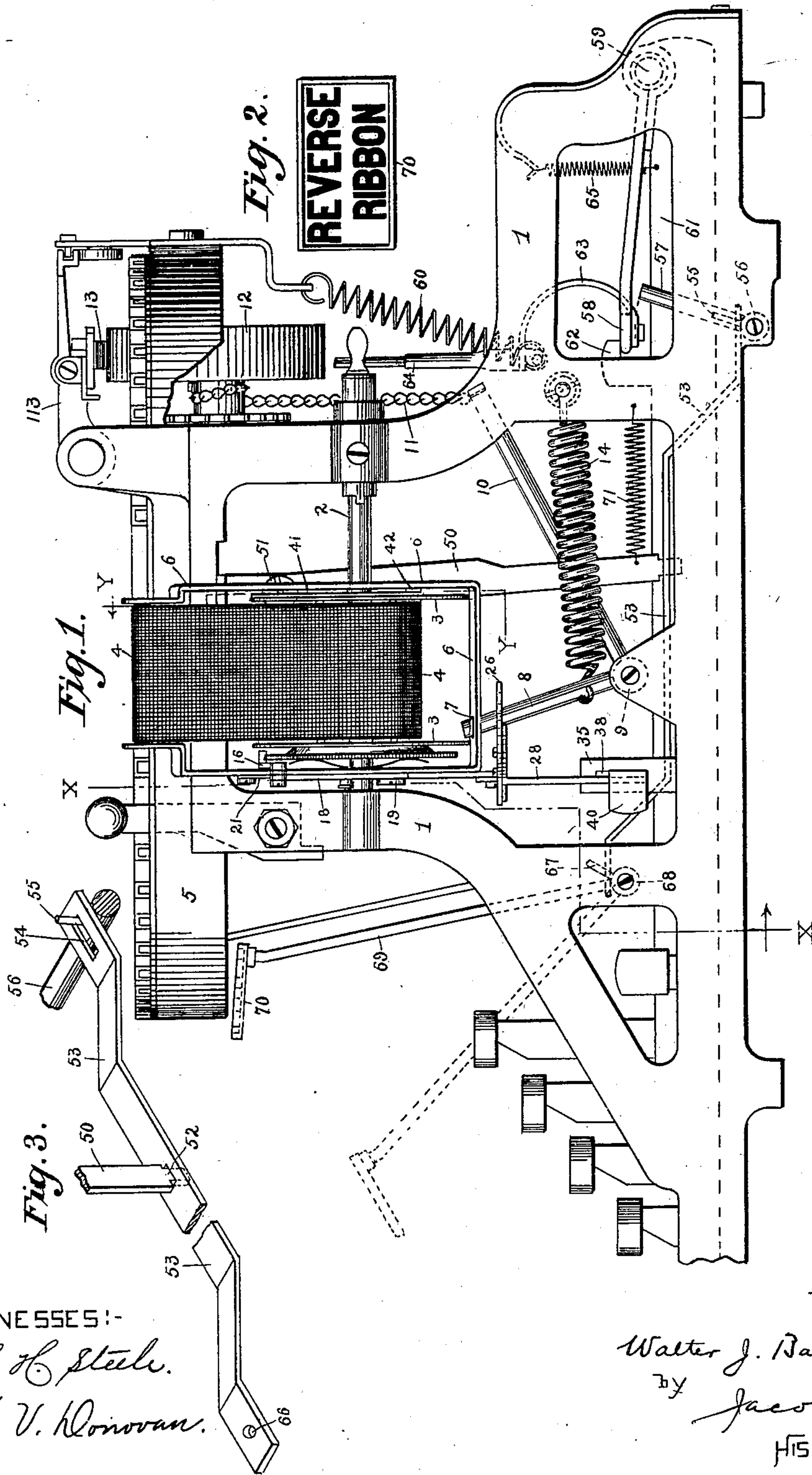
No. 725,919.

PATENTED APR. 21, 1903.

W. J. BARRON.  
TYPE WRITING MACHINE.  
APPLICATION FILED DEC. 14, 1898.

NO MODEL.

3 SHEETS—SHEET 1.



WITNESSES:-

H. H. Steele.

K. V. Donovan.

INVENTOR,

Walter J. Barron

by

Jacob Felbel

HIS ATTORNEY.

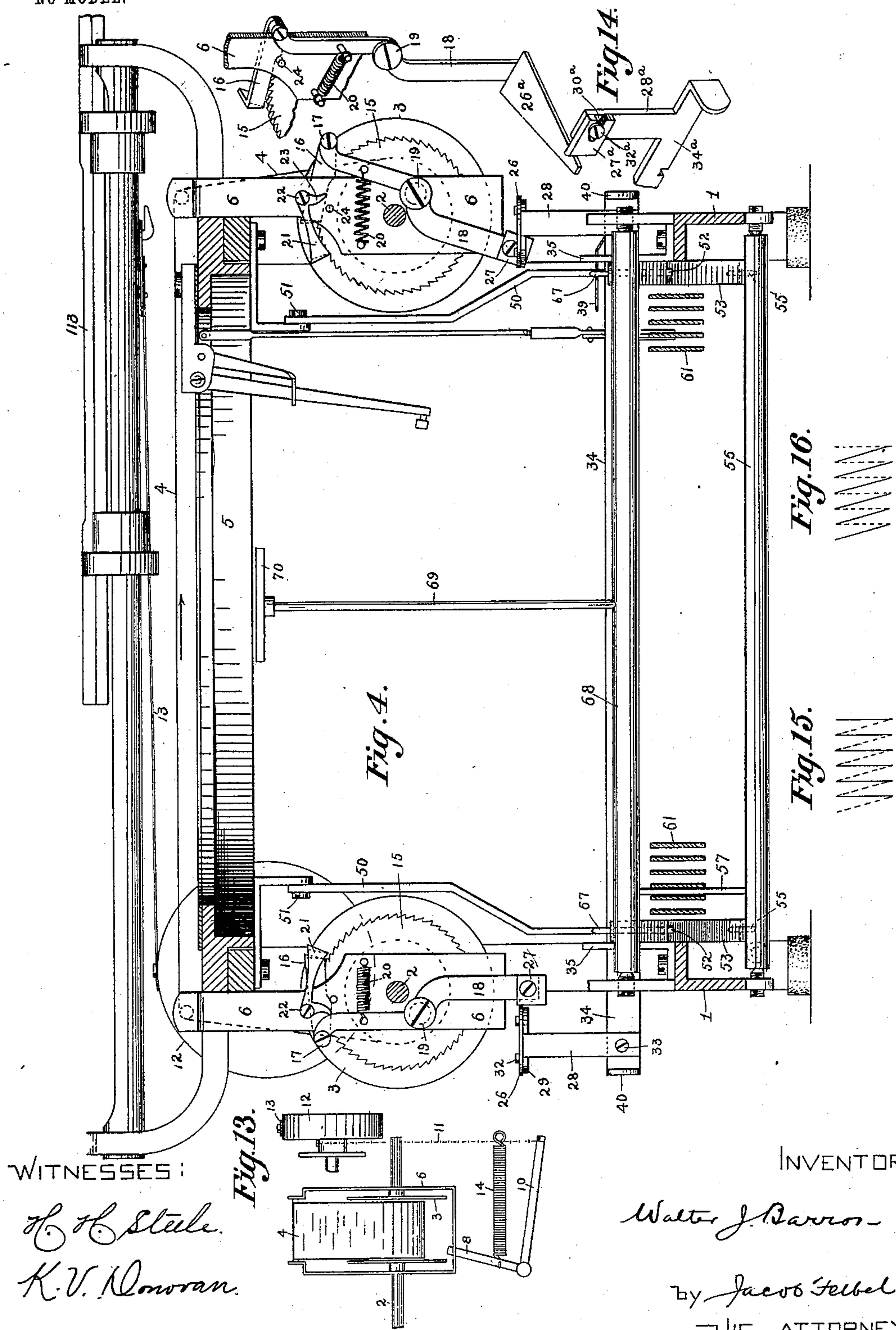
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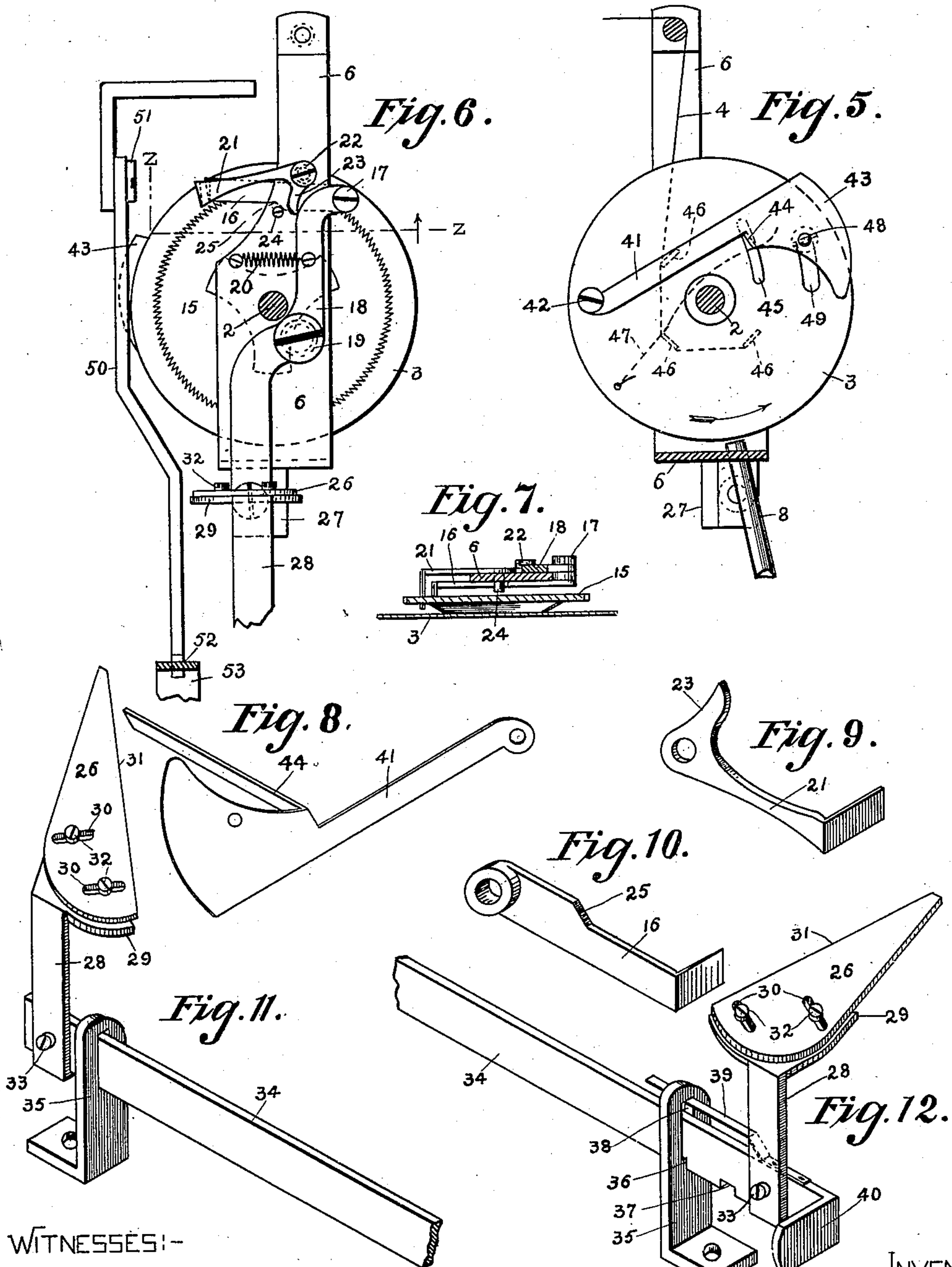




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# UNITED STATES PATENT OFFICE.

WALTER J. BARRON, OF BROOKLYN, NEW YORK, ASSIGNOR TO THE DENS-  
MORE TYPEWRITER COMPANY, OF SYRACUSE, NEW YORK, A CORPO-  
RATION OF NEW YORK.

## TYPE-WRITING MACHINE.

SPECIFICATION forming part of Letters Patent No. 725,919, dated April 21, 1903.

Application filed December 14, 1898. Serial No. 699,238. (No model.)

*To all whom it may concern:*

Be it known that I, WALTER J. BARRON, a citizen of the United States, and a resident of the borough of Brooklyn, in the city of New York, in the county of Kings and State of New York, have invented certain new and useful Improvements in Type-Writing Machines, of which the following is a specification.

My improvements have for their main objects to provide simple and effective means for moving the inking-ribbon crosswise, means for feeding the inking-ribbon longitudinally, means for automatically locking the keyboard and the printing mechanism at the end of a predetermined longitudinal travel of the inking-ribbon, so as thereby to notify the operator that the direction of travel of the ribbon should be reversed, and means for automatically signaling to the operator at the completion of the longitudinal travel of the inking-ribbon for the purpose also of notifying the operator that the shifting mechanism of the inking-ribbon should be manipulated to cause the ribbon to travel in the opposite direction.

To these main ends my improvements consist in the various features of construction and combinations of devices hereinafter more fully described, and particularly pointed out in the appended claims.

In the accompanying drawings my said improvements are shown illustrated in connection with what is known as the "Densmore" type-writer, although they may of course be embodied in other styles or types of machines.

Figure 1 is a side elevation of a type-writing machine embodying my improvements, the carriage thereof being omitted. Fig. 2 is a face view of the signaling device. Fig. 3 is a perspective view of devices connected with the mechanism for locking the key-levers and the printing and spacing mechanisms and also connected with the signaling device. Fig. 4 is a vertical cross-section taken at the line  $x x$  of Fig. 1 and looking in the direction of the arrow thereat. Fig. 5 is a vertical section taken at the line  $y y$  of Fig. 1 and looking in the direction of the arrow thereat. Fig. 6 is a front elevation de-

tached of one of the ribbon-spools, the ribbon-winding mechanism, part of the means for locking the keyboard and operating the signal, and also a part of the switch mechanism connected to the spool-winding means. Fig. 7 is a horizontal section taken at the line  $z z$  of Fig. 6 and looking in the direction of the arrow thereat. Fig. 8 is a perspective view of the device that actuates the keyboard-locking mechanism, &c., when the ribbon has been unwound from one spool and needs reversing. Fig. 9 is a perspective view of one of the pawls forming part of the ribbon-winding mechanism. Fig. 10 is a similar view of the other one of the pawls employed in connection with the spool-rotating mechanism. Fig. 11 is a perspective view of the left-hand portion of the switch mechanism. Fig. 12 is a similar view of the right-hand portion of the switch mechanism. Fig. 13 is a side elevation, on a reduced scale, illustrating a modification of the arrangement of the parts concerned in the crosswise feed of the ribbon. Fig. 14 is a perspective view illustrating a modification of the means for moving the ribbon longitudinally. Fig. 15 is a diagram showing how the ribbon is moved and used when fed crosswise and lengthwise under the arrangement of the parts shown in the main views, and Fig. 16 is a similar view showing how the ribbon is moved and used when the parts are arranged to operate as illustrated in the modification of Fig. 13.

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

At each side of the main frame 1 of the machine is provided a ribbon-spool shaft or axle 2, upon which is mounted to turn and to slide a ribbon-spool 3. An inking-ribbon 4 is connected to each spool and extends across the top plate 5 of the machine, as common heretofore. Surrounding or embracing each ribbon-spool is a frame or carrier 6, supported upon the ribbon-spool shaft and adapted to slide endwise of the same and to carry the ribbon-spool with it during its back-and-forth movements. The said frame or carrier at its upper end also acts as a ribbon guide and



support. The lower cross-bar of the ribbon-spool frame or carrier is formed or provided with a perforation 7, through which projects a rocker-arm 8, extending upwardly from a rock-shaft 9, that is mounted in suitable bearings at the base of the machine-frame. An arm or lever 10 projects rearwardly from said rock-shaft at the left-hand side of the machine and by means of a strap, cord, or chain 11 is connected to the axis of the spring wheel or drum 12, which through a suitable band 13 connects with the paper-carriage 113. (Shown in part.) By this construction and arrangement the ribbon-spools, the ribbon-spools, and the ribbon are all moved forwardly or toward the operator when the paper-carriage is retracted or moved back by hand to the right for the beginning of a new line, and during this operation the band or belt 13 unwinds from the spring-drum 12. Hence the crosswise movement of the ribbon toward the front of the machine is effected quickly or uninterruptedly and while the types are at rest. The ribbon is moved crosswise in the opposite direction or rearwardly step by step during the operation of printing and as the carriage moves step by step toward the left, the strap or chain 11 at this time unwinding from the axis of the spring-drum and permitting a coiled spring 14, connected at one end to the framework and at the other end to one of the rocker-arms 8, to pull said rocker-arm, rearwardly, or in a direction away from the operator. In this crosswise movement of the inking-ribbon it is used substantially for its full width in a line substantially at right angles to the edges of the ribbon.

In the present case the ribbon-spools are rotated one at a time by a pawl-and-ratchet mechanism which is actuated during the forward movement of the spool-carriers when the paper-carriage is retracted for the beginning of a new line.

Each ribbon-spool is formed or provided with a ratchet-wheel 15, the teeth of one being cut or formed in a direction opposite to those of the other.

For each ribbon-spool there is provided a driving-pawl 16, which is pivoted at 17 at the upper end of a lever 18, that is pivoted at 19 upon the ribbon-spool frame or carrier 6. A spring 20 is attached at one end to said frame or carrier and at its opposite end to the upper arm of the lever 18. Each spool-ratchet is also provided with a dog or detent 21, pivoted at 22 upon the ribbon-spool carrier and formed with a downwardly-extending lug or heel 23. On each ribbon-spool carrier is a stop-pin 24, with which coöperates an inclined or cam face 25 on the lower edge of the driving-pawl 16, and in consequence of which the said pawl is lifted out of engagement with the teeth of the ratchet-wheel 15, when the spring 20 is free to act to pull the upper end of the lever 18 inwardly or to an upright position, as shown at the left-hand side of Fig. 4 and

at Fig. 6. When the upper end of the lever 18 moves inwardly, it strikes the heel 23 and vibrates the dog 21 about its pivot and causes it to be disengaged from the ratchet-wheel.

The lower end of each lever 18 is adapted to coöperate with a relatively fixed cam 26, by which the said lever is vibrated against the tension of the spring 20, and, if desired, the lower free end of the lever may be provided with a hardened shoe or bearing-piece 27 to prevent undue wear. Each cam-piece 26 is adjustably mounted upon its support, which, as in this case, may consist of an upright 28, formed or provided at its upper end with a horizontal table 29, upon which the cam rests. The cam is provided with two parallel slots 30, arranged at right angles to its active edge 31, and through these slots pass two screws 32, whose ends enter threaded holes in the bearing-plate or table 29 below. Thus the active edges 31 of the cams may be adjusted relatively to the lower end of the lever 18, so as to act upon the same at the proper time and to the proper extent. The upright 28 is secured by a screw 33 to a transversely-arranged switch or shifter bar 34, that is supported edgewise in suitable vertically-arranged brackets 35, attached to the main frame. The said switch-bar is formed at its lower edge with two notches 36 and 37, the sides of which are adapted to embrace the body of the right-hand bracket 35, just below the vertical slot 38 formed therein, and thus lock the switch-bar against accidental longitudinal movement. A spring 39 is secured to the upper edge of the switch-bar and bears at its free end against the upper end of the slot 38, so as to hold the switch-bar down and either of the notches 36 or 37 in locking engagement with the bracket. The right-hand end of the switch-bar is preferably provided with a finger-piece 40 to facilitate the adjustments of said bar.

As shown at Fig. 4, the right-hand spool is now the winding-spool, the switch being so set that the right-hand cam 26 will act on the spool-winding means at this side of the machine at each forward movement of the spools, and, as will also be seen at said figure, the left-hand cam attached to the switch-bar is out of operative relation to the lower end of the left-hand lever 18, and hence said lever remains inactive while the right-hand lever is performing its work. At this time the driving-pawl 16, attached to the left-hand lever, is held out of engagement with its associated ratchet-wheel 15 by reason of the contact of the inclined or cam edge 25 with the pawl-lifting pin 24 on the frame 6, and at the same time the dog 21 is held out of engagement with the said ratchet-wheel by reason of the contact of the upper end of the lever 18 with the heel 23 on said dog. The said pawl and the said dog are maintained thus in inoperative position as long as the spring 20 is free to act on the lever 18 and hold it in the vertical position shown, and in conse-



quence the left-hand spool is free to rotate and pay off the ribbon under the pull of the right-hand spool. At near the beginning of the forward movement of the right-hand spool toward the operator the lower end of the lever 18 thereat comes in contact with the inclined or cam edge 31 of the cam-plate 26, and as the forward movement is continued the lever 18 is vibrated about its pivot, the spring 20 is stretched, and the pawl 16 at the upper end of the lever is carried outwardly, and being in engagement with a ratchet-tooth of the wheel 15 causes said wheel and the spool to turn slightly and a portion of the ribbon to be wound upon the spool, the dog 21 at the same time being in engagement with the said ratchet-wheel and preventing any return movement of the spool. As the spool moves rearwardly the lower end of the lever 18 rides back along the cam 31 and is gradually released thereby, and in consequence the spring 20 causes the lever 18 to vibrate in the opposite direction to that caused by the cam edge, whereby the pawl 16 is moved inwardly over the teeth of the ratchet-wheel and in position to engage a fresh tooth thereof, but which, however, it does not seize until near the beginning of the next forward movement of the spool, for when the cam 25 on the pawl touches the pin 24 the pawl is raised above the plane of the ratchet-wheel, and when the upper end of the lever 18 strikes the heel 23 the dog 21 is likewise lifted above the plane of the wheel, so that during the time the lever 18 is not being acted upon by the cam 26 the driving-pawls and detent-dogs of both spools are held out of engagement with the ratchet-wheels, and in consequence the ribbon is free to be moved by hand, if desired, in either direction or wound quickly from one spool to the other. The construction also permits the operator conveniently to change from one kind of ribbon to another in case two ribbons are in use in the machine at the same time, and it also permits of convenient removal of an old or worn-out ribbon and the substitution thereof of a new one.

By arranging the cams 26 so that the ribbon is caused to move lengthwise at or near the beginning of the crosswise movement of the ribbon, as well as during the remainder thereof, provision is thereby made for always advancing the ribbon longitudinally, whether the carriage be retracted to its full extent or only partially and whether such retraction occurs from the extreme left-hand end of the travel or from a point to the right thereof. Thus when short-line or tabular or column work is being done at any place or places on the sheet the ribbon will be fed both crosswise and longitudinally and will not be used over in the same spot or places. As soon as the lower end of the lever 18 strikes the cam 26 the upper end of the lever 18 starts to move outwardly, and immediately the cam 25 leaves the pin 24 the pawl drops behind a fresh tooth

of the ratchet-wheel and proceeds to pull upon the same, and simultaneously the detent 21 drops into engagement with the ratchet-wheel by reason of the departure of the lever 18 from the heel 23 of said detent. When the ribbon has been wound entirely upon the right-hand spool or has been wound thereon as far as the operator desires, the shifter or switch bar may then be pulled endwise toward the right to throw out of action the right-hand cam 26 and bring into action the left-hand cam 26, whereupon the lever 18 will be left free to be acted upon by the spring 20, and the right-hand pawl 16 and detent 21 will be automatically lifted out of engagement with their associated ratchet-wheels, and these right-hand devices will be maintained in the positions in which the left-hand devices are represented at Fig. 4 during the entire time the ribbon is being wound upon the left-hand spool.

In operating the shifter-bar to bring the left-hand cam 26 into action said bar is first slightly lifted to disengage the notch 37 from the bracket 35, and it is then pulled toward the right, so that the notch 36 may engage said bracket, as shown at Fig. 12.

I shall now describe the means employed for locking the keyboard or printing and escapement mechanisms when the ribbon has been entirely unwound from one spool and needs reversing.

Each ribbon-spool is provided with an arm 41, which is pivoted eccentrically, as at 42, to one of the heads of the spools, and said arm is formed or provided with a wing or actuating portion 43, which normally lies within the peripheral line of the spool-head, but which when the ribbon is unwound is adapted to project beyond the periphery of the head and actuate a mechanism presently to be described. The said arm 41 is also preferably provided with a bar 44, which is arranged at right angles to the arm and passes through a curved slot 45, formed near the center of the spool, but eccentrically thereof. The said bar 44, together with three other bars 46, parallel with each other and rigidly connecting the spool-heads, constitutes the core or skeleton body of the spool and about which the ribbon is wound. At Fig. 5 the arm 41 is uninfluenced by the ribbon and is shown as moved to an abnormal position by a spring 47, one end of which is attached to the spool-head, while the opposite end presses against the under side of the cross-bar 44, thus holding said bar at the outer end of its slot and causing the wing 43 to be projected beyond the periphery of the spool-head. The said wing-like portion may be provided with a pin 48, adapted to work in a guide-slot 49, formed from the pivot 42 as a center. Assuming the spool now to rotate in the direction of the arrow at Fig. 5, the ribbon will act upon the bar 44 and cause it to travel to the inner or lower end of its slot, and thus to vibrate the arm 41 and carry the wing or projection 43 even with or within the peripheral line of the spool-



head, and as long as the spool continues to revolve in this direction and the ribbon to wrap around the bar 44 the wing or projection will be held in its retracted position against the tension of the spring 47 and will be incapable of performing any function; but when the spool rotates in the opposite direction and the ribbon unwinds to release the bar 44 the spring 47 then moves the arm 41 and causes the wing to be projected beyond the spool-head; as shown at Fig. 5. While in this position the wing is then adapted to act on a vertically-arranged arm or lever 50, pivoted at its upper end at 51 in the framework and connected at its lower end by a slot and pin 52 to a sliding or movable device 53, which in turn is connected to a locking mechanism and also to a signaling contrivance. The device 53 is made in the form of a bar with suitable bends to reach the devices which it is to act upon. The bar 53 is horizontal where the lower end of the lever 50 connects with it, and from the rear end of this horizontal portion the bar is bent downwardly and rearwardly and terminates in a horizontal portion that is slotted at 54 and embraces a pin 55 on a transverse rock-shaft 56, which bears an upright rocker-arm 57, that is adapted to swing under the universal bar or bail 58 of the key-lever system. This universal bar is preferably pivoted at the rear of the machine at 59 and is provided, as usual, with a spring 60, that tends normally to hold it up. The key-levers 61, also pivoted at the rear of the machine, have each a hook 62, that bears upon the upper side of the universal bar, and when each key-lever is depressed the universal bar is caused to descend with it. By suitable connections, as the curved arm 63 and rod or link 64, the universal bar is joined to the carriage escapement-dogs, (not shown,) and hence when the universal bar is actuated by the key-levers the escapement mechanism connected with the paper-carriage is likewise actuated. Each key-lever may be provided with a separate returning-spring 65. Whenever the rocker-arm 57 is swung forward under the universal bar, the said bar is locked or held from descending under any pressure upon the keys, and being thus held the key-levers themselves are likewise prevented from being depressed, and thus the keyboard and the printing and escapement mechanisms are prevented from acting at this time. The locking-arm 57 may be and preferably is also connected with the carriage-propelling mechanism, so as to act as a line-locking device, as common in the "Densmore" machine.

The forward end of the bar 53 extends upwardly and forwardly and terminates in a horizontal portion, which is formed with a round hole 66, that embraces a pin 67 on a rock-shaft 68, extending across the machine and provided about centrally thereof with an upright arm 69, having attached at its upper end a plate or tablet 70, preferably inscribed with the words "Reverse ribbon" or with

words of like import. Normally the locking rocker-arm 57 stands out of engagement with the universal bar, and the signal-arm 69 stands in such a position that the inscription on the plate 70 is held out of view; but when the ribbon has paid off from either spool and the lever 50 is actuated by the wing or projection 43 the locking-arm 57 is moved to a position to arrest the downward movement of the universal bar, and the arm 69 is vibrated downwardly, so as to expose the marking on the plate carried thereby. Thus at one time the key-levers are locked and a visual notice or signal is given to the operator that the ribbon has reached the end of its travel in one direction and that the reversing mechanism should be manipulated to enable the ribbon to travel in the reverse direction. Of course the locking of the keyboard or key-lever system, which is connected to the type-bars, as shown in Fig. 4, prevents absolutely the further manipulation of the printing and escapement mechanisms, and hence the ribbon cannot be struck by the types when it has arrived at the end of its travel, thus obviating the objection heretofore common of pounding the ribbon on one spot and stretching or straining the same unwittingly when the longitudinal movement of the ribbon has ceased, and in so far as the main feature of this part of my invention is concerned the visual signal or notice may be omitted; but inasmuch as the locking-arm 57 is preferably, also, used to lock the printing and escapement mechanisms when the carriage has reached the end of a predetermined line of travel I prefer to use the signaling device for the purpose of apprising the operator when the ribbon needs reversing in order that he may not mistake the locking of the keyboard as an indication that the carriage has come to the end of its prearranged travel. When the arm 57 is operating as a line-lock, the tablet 70 is not simultaneously actuated, and this is effected by providing the bar 53 with the slot 54, which enables the pin 55 on the rock-shaft 56 to move through said slot without transmitting any motion to the bar 53, thus enabling the shaft 56 to be rocked by the line-locking mechanism and the arm 57 to swing under the universal bar without at the same time affecting the tablet 70. When the bar 53 is moved by the lever 50, it pulls against the pin 55 on the rock-shaft, thus rocking the arm 57 under the universal bar, and at the same time the bar 53 pushes upon the pin 67 and rocks the tablet down to the dotted-line position (shown at Fig. 1) into full view of the operator. The lever 50 is provided with a returning-spring 71, one end of which is fastened to the frame and the other to said lever, which spring acts normally to hold the bar 53 and the arms 57 and 69 in their rearmost or normally inoperative positions. When the ribbon has paid off either spool and the bar 44 is released, the eccentrically-pivoted projection or wing 43 moves out into



operative position, and as the spool comes forward or toward the operator it strikes against the lever 50 and vibrates it forwardly and causes the bar 53 to move in the same direction and pull the locking-bar 57 under the universal bar and at the same time cast down the tablet, thus locking the keyboard and notifying the operator as to the cause thereof. The operator will then actuate the switch-bar 34 by moving it endwise, as before explained, and at the same time the empty spool may be turned or partially turned by hand to cause the ribbon to wrap around the bar 44 and effect a withdrawal or retraction of the wing or projection 43. In this manner the mechanism for moving the ribbon longitudinally is reversed, and at the same time the keyboard is unlocked and the machine restored to operative condition. As soon as the projection 43 is retracted the spring 71 will retract the lever 50, which in turn will move the sliding bar 53 rearwardly, and this will restore the locking-arm 57 and the signal-arm 69 to their normal or inoperative positions.

The actuating-lever 50 is hung in such position that the wing or projection 43 will never strike on the front edge of said lever, and thus block the action of the machine. If this bar 44 should happen to be released after the wing had passed by the rear edge of the lever 50, the edge of the wing would simply scrape along the inner face or broad side of the lever 50 during the forward movement of the spool, which latter reaches its limit in this direction before the wing comes to the forward edge of the lever 50, and hence said wing can never fly out in front of said lever. During the return or backward movement of the spool the wing would also rub along the inner side of the lever 50 until the rearmost edge of said lever should be reached, when the wing would then fly out and overlap said edge, and on the next forward movement of the spool the said wing would then strike against said lever and actuate it, as hereinbefore explained.

In the foregoing description reference has been had mainly to the views numbered 1 to 12, inclusive.

Referring now to Fig. 13 and comparing it with Fig. 1, it will be seen that the same elements are employed in both structures, but that their arrangement and mode of operation are somewhat different—that is to say, in Fig. 1 the chain 11 winds upon the axis of the spring-drum during the retraction of the carriage and at which time the belt 13 unwinds from the spring-drum, and owing to the winding of the chain 11 upon the axis or hub of the spring-drum at this time the arm 10 is lifted and the arm 8 is vibrated forwardly and the ribbon-spools and ribbon are moved toward the operator, during which action the spring 14 is expanded, all so that when the carriage feeds down toward the left step by step the strap 13 rewinds upon the

spring-drum and the chain 11 unwinds from the hub thereof and the spring 14 moves the ribbon-spools and ribbon rearwardly.

In Fig. 13 the strap 13 is shown as unwound from the spring drum, as in Fig. 1, and at which time the carriage is supposed to be at the right-hand side of the machine; but, unlike Fig. 1, the chain 11 is at this time also unwound from the axis or hub of the spring-drum, and in consequence the arm 10 is at the limit of its downward movement, the arm 8 is at the limit of its rearward movement, and the ribbon spools and ribbon at the limit of their rearward movement, and the spring 14 is contracted. With the parts in the positions shown at Fig. 13, as the carriage starts to move from right to left the strap 13 will wind upon the spring-drum and the chain 11 will wind upon the hub thereof, and as the arms 10 and 8 are vibrated the ribbon-spools and ribbon are moved forwardly step by step and the spring 14 is stretched. When the carriage is retracted, the spring causes the ribbon-spools and ribbon to move rearwardly as the chain 11 is let off. Thus in this case the ribbon moves rearwardly when the carriage is returned to the right instead of forwardly, as in Fig. 1.

The means for moving the ribbon longitudinally and for locking the keyboard, &c., may be used with the arrangement shown at Fig. 13 as well as with that shown at Fig. 1. Where the ribbon-spools and ribbon move quickly forward during the retraction of the carriage, as in Fig. 1, the compound movement of the ribbon, due to the crosswise feed and the longitudinal feed, is represented by the dotted lines at Fig. 15, while the return or rearward movement of the ribbon during the letter-feed of the carriage from right to left is represented by the full lines at Fig. 15, which latter lines are at right angles to the edges of the ribbon, or substantially so, while the dotted lines which are not struck by the types are oblique or at an angle to the edges of the ribbon. Where the ribbon is arranged to move as in Fig. 13, it is struck by the types on diagonal lines, (represented by the full lines in Fig. 16,) and the quick movements of the ribbon rearwardly effected when the carriage is retracted are represented by the dotted lines at Fig. 16, and therefore it will be seen that in so far as the main features of my improvements relating to the crosswise and longitudinal feed of the ribbon are concerned it is not material whether the ribbon be arranged to move crosswise toward the front of the machine when the carriage is retracted, as in Fig. 1, or whether it be arranged to move crosswise rearwardly during such retraction, although I prefer the arrangement shown at Fig. 1.

Referring now to Fig. 14, it will be seen that the modification therein shown consists mainly in mounting the cam 26<sup>a</sup> (which corresponds to the cam 26 in the other views) upon the lower end of the lever 18 instead of



upon the switch-bar. Where the cam 26<sup>a</sup> is mounted upon the lever, the switch-bar may be provided with a cooperating device, as the plate or shoe 27<sup>a</sup>, which may be provided with a slot 30<sup>a</sup>, so that the actuating device may be adjusted longitudinally to cooperate with the cam 26<sup>a</sup> at the proper moment and to the desired extent, a set-screw 32<sup>a</sup> passing through said slot and entering a tapped hole in the upright 28<sup>a</sup>, attached to or formed integral with the switch-bar or shifter 34<sup>a</sup>. The lever 18 in this modification is provided with a spring 20 and a driving-pawl 16, having a cam edge adapted to a pin 24 on the ribbon-spool carrier, precisely as in the main views, and in connection therewith is to be used a detent 21, pivoted on the ribbon-carrier and having a heel 23, adapted to be acted upon by the upper end of said lever, as shown in the said other views and hereinbefore described with reference thereto. The operation of the mechanism illustrated at Fig. 14 is substantially the same as that hereinbefore described in connection with the other views; but in this case the cam that acts to vibrate the lever in one direction to produce the described actions of the pawl and detent is mounted upon or carried by the lever instead of the shifter-bar. When in the forward movement of the spool-carrier the cam edge strikes the actuating device 27<sup>a</sup>, the lever 18 is vibrated and the pawl 16 and the detent 21 are permitted to engage the ratchet-wheel, and during the continued forward movement of the cam the said pawl is caused to turn the said ratchet-wheel owing to the continued vibration of the lever. When the ribbon-spool is at the end of its rearward movement, the cam is out of engagement with its actuating-piece, and the pawl and detent are in consequence maintained out of engagement with the ratchet-wheel, so that the spool is free to be turned by hand. Owing to the elongation of the cam 26<sup>a</sup>, in this case as in the other the lengthwise movement of the ribbon is caused to occur very soon after the carriage commences its movement toward the left, and this movement of the carriage continues during the entire forward or step-by-step movement of the carriage. It will also be seen that the cam 26<sup>a</sup> is of such length and is so disposed as that the ribbon will be caused to feed lengthwise even though the carriage movement be short, as explained above in connection with the other views where tabular or column or other short-line work is being done.

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

1. The combination of a printing mechanism, an inking-ribbon, a ribbon-reverse signal, and means for operating said signal and for locking the printing mechanism when the inking-ribbon has traveled longitudinally a predetermined distance.

2. The combination of a printing mechanism, an inking-ribbon, a normally hidden

visual ribbon-reverse signal, and means for exposing such signal and for locking the printing mechanism when the inking-ribbon has traveled longitudinally a predetermined distance.

3. The combination of a printing mechanism, an inking-ribbon, a movable visual ribbon-reverse signal, and means for moving said signal and for locking the printing mechanism when the inking-ribbon has traveled longitudinally a predetermined distance.

4. The combination of a printing mechanism, an inking-ribbon, a ribbon-reverse signal, a lock for said printing mechanism, a to-and-fro movable device operatively controlled by said signal and said lock, and means connected with the ribbon for moving said device when the ribbon has traveled a predetermined distance and causing said device and connections to operate the signal and the lock.

5. The combination of a printing mechanism, an inking-ribbon, a normally hidden visual ribbon-reverse signal, a lock for said printing mechanism, a to-and-fro movable device operatively connected with said lock and adapted to expose said signal, and means controlled by the ribbon for moving said device when the ribbon has traveled a predetermined distance and causing said device and said connections to expose the signal and operate the lock.

6. The combination of a printing mechanism, an inking-ribbon, a movable visual ribbon-reverse signal, a lock for said printing mechanism, a to-and-fro movable device operatively connected with said signal and said lock, and means controlled by the ribbon for moving said device when the ribbon has traveled a predetermined distance and causing said device and connections to operate the signal and the lock.

7. The combination of a printing mechanism, an inking-ribbon, a ribbon-reverse signal, a lock for said printing mechanism, a pivoted lever operatively connected with said signal and said lock, and means controlled by the ribbon for operating said lever when the ribbon has traveled a predetermined distance longitudinally and causing said lever and connections to operate the signal and the lock.

8. The combination of a printing mechanism, an inking-ribbon, a normally hidden visual ribbon-reverse signal, a lock for said printing mechanism, a pivoted lever operatively connected with said lock and to expose the said signal, and means controlled by the ribbon for operating said lever when the ribbon has traveled longitudinally a predetermined distance and causing said lever and connections to expose the signal and operate the lock.

9. The combination of a printing mechanism, an inking-ribbon, a movable visual ribbon-reverse signal, a lock for said printing mechanism, a pivoted lever operatively con-



5 nected with said signal and said lock, and means controlled by the ribbon for moving said lever when the ribbon has traveled longitudinally a predetermined distance and causing said lever and connections to operate the signal and the lock.

10 10. The combination of a printing mechanism, an inking-ribbon, a ribbon-reverse signal, a lock for said printing mechanism, a pivoted lever, an endwise-movable bar operatively connected with said lever the said lock and the said signal for operating the last two, and means controlled by the ribbon for operating said lever and connected parts when  
15 the ribbon has traveled longitudinally a predetermined distance whereby the printing mechanism is locked and the signal operated.

20 11. The combination of a printing mechanism, an inking-ribbon, a ribbon-reverse signal, a lock for said printing mechanism, an endwise-movable bar operatively connected with the signal and the lock, and means for operating said bar when the inking-ribbon has traveled longitudinally a predetermined  
25 distance whereby the printing mechanism is locked and the signal operated.

30 12. The combination of a printing mechanism, an inking-ribbon, a ribbon-spool, a ribbon-reverse signal, a lock for said printing mechanism, a to-and-fro movable device adjacent said spool and operatively connected with said signal and said lock, and an arm carried by and movable on said spool toward and from the axis thereof and into position  
35 for actuating said device as the spool moves and controlled in such in-and-out movement by the ribbon and thereby causing the signal to be operated and the printing mechanism to be locked when the inking-ribbon has traveled longitudinally a predetermined distance.  
40

45 13. The combination of a printing mechanism, an inking-ribbon, a ribbon-spool moving automatically both endwise and rotatively during the operation of the machine, a ribbon-reverse signal, a lock for said printing mechanism, a to-and-fro movable device adjacent said spool and operatively connected with said signal and said lock for operating them, and an arm carried by said spool and  
50 automatically moved thereon when the ribbon has traveled longitudinally a predetermined distance and into position for operating said device and causing the operation of the signal and the locking of the printing  
55 mechanism.

60 14. The combination of a printing mechanism, an inking-ribbon, a ribbon-spool moving automatically both endwise and rotatively during the operation of the machine, a ribbon-reverse signal, a lock for said printing mechanism, a pivoted lever adjacent said spool and operatively connected with said signal and said lock, and a spring-pressed arm pivoted to said spool eccentrically thereof  
65 and having a bar forming part of the skeleton or core about which the ribbon is wound, the axis of the spool being intermediate the

pivot of the arm and said bar and said arm being movable on said spool into and out of position for operating said lever and being  
70 controlled in such movement by the ribbon.

15. The combination of a printing mechanism, an inking-ribbon, a ribbon-spool moving automatically both endwise and rotatively during the operation of the machine, a ribbon-reverse signal, a lock for said printing mechanism, a pivoted lever adjacent the spool in its endwise movements and operatively connected with said lock and said signal, an arm pivoted to an end of said spool  
80 eccentrically thereof and provided with a bar projecting through a slot in said spool end and also provided with a wing or actuating portion normally lying within the periphery of the spool end, and a spring for actuating  
85 said arm and moving it into position for actuating said lever, signal and lock, whereby the printing mechanism is locked and the signal operated after the unwinding ribbon has released the bar.  
90

16. The combination of an inking-ribbon, a ribbon-spool therefor, a visual ribbon-reverse signal, and connections carried partly by the frame of the machine and partly by said spool for operating said signal after the ribbon has  
95 unwound to a predetermined extent and the said part of said connections carried by said spool being held by the ribbon in a position in which they are inoperative until the ribbon has unwound as described.  
100

17. The combination of an inking-ribbon, a ribbon-spool therefor, a visual ribbon-reverse signal, a movable device adapted to be moved into its inoperative position by the ribbon as it winds on the spool, and connections for operating said signal, said connections being  
105 operated by the said movable device when it has been released by the unwinding of the ribbon and moved into its operative position and brought into engagement with said connections by a motion of said ribbon-spool.  
110

18. The combination of an inking-ribbon, a ribbon-spool therefor, a visual ribbon-reverse signal, a device movable toward and from the center of said spool and moved toward the  
115 center by the ribbon as it winds on said spool and movable away from the center when freed by the unwinding of the ribbon, and means operated by said in-and-out movable device and operating said signal after the ribbon has released the said device and during  
120 a motion of said spool.

19. The combination of an inking-ribbon, a ribbon-spool, a visual ribbon-reverse signal, an arm pivotally connected to the ribbon-spool and movable toward and from the center thereof and controlled in such motion by the winding and unwinding of the ribbon, and mechanism connected with the said signal and operated by the said arm when the  
125 inking-ribbon has moved longitudinally a predetermined distance.  
130

20. The combination of an inking-ribbon, a ribbon-spool moving automatically both end-



wise and rotatively during the operation of the machine, a ribbon-reverse signal, an arm pivotally connected with the spool and movable toward and from the center thereof and controlled in such movement by the ribbon in winding and unwinding, a lever pivoted to move in the direction of the endwise motion of said spool and in position to be operated by said arm when released by the ribbon and moved away from the center of the spool and means connecting the lever with the signal to operate the same when moved by said arm on said spool.

21. The combination of an inking-ribbon, a ribbon-spool moving automatically both endwise and rotatively during the operation of the machine, a ribbon-reverse signal, a lever adjacent the path of the spool in its endwise motion and operatively connected with said signal, and an arm pivoted to said spool eccentrically thereof and provided with a bar forming part of the core or skeleton body of the spool upon which the ribbon is wound and said arm being movable into position for operating said lever when released from the control of the ribbon in the unwinding thereof, whereby said lever and the signal are operated.

22. The combination of an inking-ribbon, a ribbon-spool moving automatically both endwise and rotatively during the operation of the machine, a ribbon-reverse signal, a lever pivoted to move in the direction of the endwise motion of said ribbon-spool and operatively connected with said signal, and a spring-pressed bar pivotally connected with a spool end eccentrically thereof and provided with a bar projecting through a slot in the spool end and forming part of the core or skeleton body of the spool on which the ribbon is wound and said bar being movable on its said pivot into and out of position for operating said lever and controlled in such movement by the winding and unwinding of the ribbon.

23. The combination of a printing mechanism, an inking-ribbon, a rotatable ribbon-spool which is likewise movable in the direction of its axis of rotation, a lock for said printing mechanism, a device movable relatively to said spool and adapted to be moved toward the center thereof by the ribbon as the latter winds on the spool and to be freed by the ribbon as it unwinds to move outward into its operative position, and means for operating said lock and operated by said device when in its outer or operative position and during a motion of the ribbon-spool in the direction of its axis of rotation.

24. The combination of a printing mechanism, an inking-ribbon, a rotatable ribbon-spool which is likewise movable in the direction of its axis of rotation, a lock for said printing mechanism, and normally disconnected devices one of which is on and rotates with the spool and is controlled in its operation by the winding and unwinding of the

ribbon and thrown into operative connection when the ribbon has unwound to a given extent from the spool and is adapted to actuate the lock for the printing mechanism during an axial movement of the ribbon-spool.

25. The combination of a printing mechanism, an inking-ribbon, a rotatable ribbon-spool which is likewise movable in the direction of its axis of rotation, a lock for the printing mechanism, devices intermediate said lock and said spool and a device on the spool and controlled by the ribbon for actuating said intermediate devices when the ribbon has unwound from said spool to a predetermined extent or distance, the actuation of said lock being controlled by said intermediate devices through an axial movement of the ribbon-spool.

26. The combination of a printing mechanism, an inking-ribbon, a ribbon-spool, a lock for said printing mechanism, a to-and-fro movable device adjacent said spool and operatively connected with said lock, and an arm pivotally connected with said spool and movable toward and from the center thereof and controlled in such movement by the ribbon in winding and unwinding, and movable into position for operating said device and lock, whereby when the said arm is released it is adapted to cause the locking of the printing mechanism.

27. The combination of a printing mechanism, an inking-ribbon, a ribbon-spool, a pivoted lever adjacent said spool, a lock for said mechanism operatively connected with said lever, an arm pivotally connected with a spool end eccentrically thereof and provided with a bar forming part of the core or skeleton body of the spool and the arm being movable into and out of position for operating said lever and lock as the ribbon unwinds and winds on the spool.

28. The combination of a printing mechanism, an inking-ribbon, a ribbon-spool, a lock for said printing mechanism, a pivoted lever adjacent said spool, and a spring-pressed arm pivoted to a spool end eccentrically thereof and provided with a bar projecting through a slot in said spool end and forming part of the core or skeleton body of the spool and the free end of the arm being movable into and out of position for actuating said lever and operating said lock when the ribbon has moved longitudinally a predetermined distance.

29. The combination of a printing mechanism, an inking-ribbon, a ribbon-spool moving automatically both endwise and rotatively during the operation of the machine, a lock for said printing mechanism, a pivoted lever adjacent the path and movable in the direction of the endwise movement of the spool and operatively connected with said lock, and an arm on the spool and movable toward and from the center thereof and controlled in such movement by the winding and unwinding ribbon and movable into position for actuating



said lever and lock when the ribbon has moved longitudinally to a predetermined point or distance.

30. The combination of a printing mechanism, an inking-ribbon, a ribbon-spool moving automatically both endwise and rotatively during the operation of the machine, a lock for said printing mechanism, a pivoted lever adjacent to and movable in the direction of the path of the endwise movement of said spool and operatively connected with said lock, an arm pivotally connected with an end of said spool eccentrically thereof and provided with a bar forming part of the core or skeleton body of said spool and controlled by the winding and unwinding of said ribbon, and the arm having its free end movable into and out of position for actuating said lever and lock.

31. The combination of a printing mechanism, an inking-ribbon, a ribbon-spool moving automatically both endwise and rotatively during the operation of the machine, a lock for said printing mechanism, a pivoted lever adjacent to and movable in the direction of the path of the endwise movement of the spool, a spring-pressed arm pivotally connected to a spool end eccentrically thereof and provided with a bar projecting through a slot in said end and forming part of the core or skeleton body of the spool and the arm having its free end movable into and out of position for actuating said lever and lock.

32. The combination of a printing mechanism, an inking-ribbon, ribbon-spools, a ribbon-reverse signal, and means for operating said signal and for locking the printing mechanism when the inking-ribbon has unwound from either spool to a predetermined extent or distance.

33. The combination of a printing mechanism, an inking-ribbon, ribbon-spools, a ribbon-reverse signal, a lock for said printing mechanism, to-and-fro movable devices adjacent said spools and operatively connected with said signal and said lock, and means connected with each spool for moving said device when the ribbon has unwound to a predetermined extent or distance from each of said spools and causing said device and connections to operate the signal and lock.

34. The combination of a printing mechanism, an inking-ribbon, ribbon-spools, a ribbon-reverse signal, a lock for said printing mechanism, pivoted levers adjacent said spools and operatively connected with said signal and said lock, and means controlled by the unwinding part of the ribbon for operating the adjacent lever when the ribbon has unwound to a predetermined extent or distance and so causing said lever and connections to operate the signal and the lock.

35. The combination of a printing mechanism, an inking-ribbon, ribbon-spools, a ribbon-reverse signal, a lock for the printing mechanism, pivoted levers adjacent said spools and operatively connected with said

signal and said lock, and arms carried by and movable toward and from the centers of said spools and into position for actuating the adjacent lever as the spools move and controlled in such in-and-out movement by the ribbon and thereby causing the signal to be operated and the printing mechanism to be locked after the inking-ribbon is unwound to a predetermined extent or distance from each of said spools.

36. The combination of a printing mechanism, an inking-ribbon, ribbon-spools, a ribbon-reverse signal, a lock for said printing mechanism, pivoted levers adjacent said spools and operatively connected with said signal and said lock, and arms pivoted to said spools eccentrically thereof and movable into and out of position for actuating said levers and controlled in such movements by the winding and unwinding ribbon, whereby the signal and lock are operated after the ribbon has unwound from each spool to a predetermined point or extent.

37. The combination of a printing mechanism, an inking-ribbon, ribbon-spools, a ribbon-reverse signal, a lock for said printing mechanism, pivoted levers adjacent said spools and operatively connected with said signal and lock, and arms pivotally connected to ends of said spools eccentrically thereof and provided with bars forming part of the cores or skeleton bodies of the spools and movable into and out of position for actuating the corresponding lever and controlled in such movement by the winding and unwinding ribbon, whereby the signal and the lock are operated after the ribbon has unwound from each spool to a predetermined extent or point.

38. The combination of a printing mechanism, an inking-ribbon, ribbon-spools moving automatically both endwise and rotatively during the operation of the machine, a ribbon-reverse signal, a lock for said printing mechanism, pivoted levers adjacent and movable in the direction of the paths of the endwise movements of said ribbon-spools and operatively connected with said lock and said signal, and arms carried by said spools and movable into and out of position for actuating said levers and controlled in such movements by the winding and unwinding of the ribbon, whereby said signal and lock are operated after the ribbon is unwound from each spool to a predetermined extent or point.

39. The combination of a printing mechanism, an inking-ribbon, ribbon-spools moving automatically both endwise and rotatively during the operation of the machine, a ribbon-reverse signal, a lock for said printing mechanism, levers adjacent to the paths of endwise motion of said spools and operatively connected with said signal and said lock, and pivoted arms upon said spools and movable in and out thereof into and out of position for actuating the corresponding lever and controlled in such in-and-out motion by the



winding and unwinding of the ribbon, whereby said signal and lock are operated when the ribbon has unwound to a predetermined extent from each of said spools.

5 40. The combination of an inking-ribbon, ribbon-spools, shafts supporting said spools, spool-carrier frames adapted to move to and fro in the direction of the axes of said spools, a rock-shaft provided with arms engaging and  
10 operating said spool-carrier frames, a spring for moving said parts in one direction, connections between said shaft and an oscillatory part of the carriage-driving mechanism for moving the parts in the reverse direction  
15 whereby the said ribbon-spools and ribbon are moved back and forth transversely of the ribbon during the back-and-forth movement of the carriage, a ribbon-reverse signal, a printing mechanism, a lock for said printing  
20 mechanism, and means controlled by the ribbon for operating said signal and said lock.

41. The combination of an inking-ribbon, ribbon-spools, a rock-shaft connected with said spools for moving them endwise to and fro,  
25 a spring for moving the shaft in one direction, an arm on said shaft, a cord or chain connected with said arm, a carriage, a spring wheel or drum connected with said carriage, and an axis on said drum with which said cord or  
30 chain is connected, whereby the ribbon-spools are reciprocated endwise during the to-and-fro motions of the carriage, a pawl-and-ratchet mechanism for each of said spools, and a cam and lever controlled by said rock-  
35 shaft and adapted to control said pawl-and-ratchet mechanism.

42. In a type-writing machine, the combination of an inking-ribbon, ribbon-spools automatically moved endwise as the carriage  
40 reciprocates, a ratchet-wheel connected with one of said spools, a lever carried to and fro with said ratchet and spool and provided with a pawl for actuating said ratchet, an upright connected with the fixed framework of the  
45 machine, and a cam intermediate said upright and said lever for swinging said lever on its axis and operating said spool, substantially as described.

43. In a type-writing machine, the combination of an inking-ribbon, ribbon-spools,  
50 spool-carrier frames automatically moved to and fro in the direction of the axes of said spools during the operation of the machine, ratchet-wheels on said spools, levers pivoted  
55 to said carrier-frames and provided with pawls for actuating said ratchet-wheels, a shift or switch bar movable transversely with the frame of the machine and provided with uprights, cams intermediate said uprights and  
60 said levers for actuating the same, springs for returning said levers to normal positions, and means for holding said pawls one at a time out of position for actuating said ratchets according to the position of the switch-bar.

65 44. In a type-writing machine, the combination of an inking-ribbon, ribbon-spools provided with ratchet-wheels, spool-carrier

frames automatically moved to and fro in the direction of the axes of said wheels during the operation of the machine, levers pivoted  
70 to said carrier-frames and provided with pawls for operating said ratchet-wheels, a transversely-movable switch-bar provided with uprights, cams intermediate said uprights and said levers for actuating the same  
75 one at a time according to the position of the switch-bar, detents carried by said frame for said ratchet-wheels, and means for holding said detents and said pawls out of engagement with their respective ratchet-wheels except at such times as said cams actuate said  
80 levers.

45. The combination of a pair of ribbon-spools, an inking-ribbon thereon, carrier-frames for said spools automatically moved in  
85 the direction of the axes of said spools during the to-and-fro movements of the carriage, ratchet-wheels on said spools, pawl-carriers on said frames, pawls on said carriers for operating said ratchets, and means for holding  
90 said pawls normally disengaged from said ratchet-wheels during a part of the to-and-fro movements of the carriers, whereby the ribbon may be wound from either spool to the other at will.  
95

46. The combination of an inking-ribbon, ribbon-spools therefor, spool-carrier frames automatically moved with the spools in the direction of the axes of the spools during the  
100 to-and-fro movements of the carriage of the machine, levers pivoted to said carriers, pawls on said levers, ratchet-wheels on said spools, means for holding said pawls disengaged from said ratchet-wheels during a part of said to-and-fro movement of the said carrier-frames,  
105 and detents for said ratchet-wheels also held disengaged therefrom, during such time, whereby the ribbon may be wound from either spool to the other freely.

47. The combination of a printing mechanism, an inking-ribbon, a ribbon-spool, an arm or device on said spool and held within the periphery thereof by the wound ribbon and  
110 automatically moved beyond the said periphery to an outer or operating position when the ribbon is unwound to a certain extent from said spool, and means for locking said printing mechanism and actuated by said arm or device when in its said outer position.  
115

48. The combination of a printing mechanism, an inking-ribbon, a ribbon-spool, a spring-pressed arm or device on said spool and movable by said spring to an outer or operative position beyond the periphery of the spool  
120 end and adapted to be held inward by the wound ribbon against the force of said spring, and means for locking said printing mechanism and actuated by said arm or device when in its said outer position.  
125

49. The combination of a printing mechanism, an inking-ribbon, a ribbon-spool, an arm pivoted to a spool end eccentrically thereof and lying across, and adapted to be held within the periphery of the spool end by the wound  
130



ribbon and to be moved beyond the said periphery when the ribbon has unwound to a given extent from said spool, and means for locking said printing mechanism and actuated by said arm when projecting beyond said periphery.

50. The combination of a printing mechanism, an inking-ribbon, a ribbon-spool automatically moved both endwise and rotatively during the operation of the machine, an arm or device on said spool adapted to be moved and held inwardly thereof by the wound ribbon and to automatically project beyond the periphery of the spool end when the ribbon is unwound to a given extent, and means for locking said printing mechanism and actuated by said arm or device when the same projects beyond the periphery of the spool end and as the spool moves endwise.

51. The combination of a printing mechanism,

an inking-ribbon, a ribbon-spool, a movable device on said spool and spring-pressed outwardly to a working or outer position beyond the periphery of the spool end and moved and held inwardly against the force of said spring by the wound ribbon and adapted to be released by said ribbon when it is unwound to a predetermined extent, and means for locking said printing mechanism and actuated by said arm or device when in its outer position and as the spool moves endwise.

Signed at borough of Manhattan, in the city of New York, in the county of New York and State of New York, this 13th day of December, A. D. 1898.

WALTER J. BARRON.

Witnesses:

M. W. POOL,  
G. K. GILLULY.