

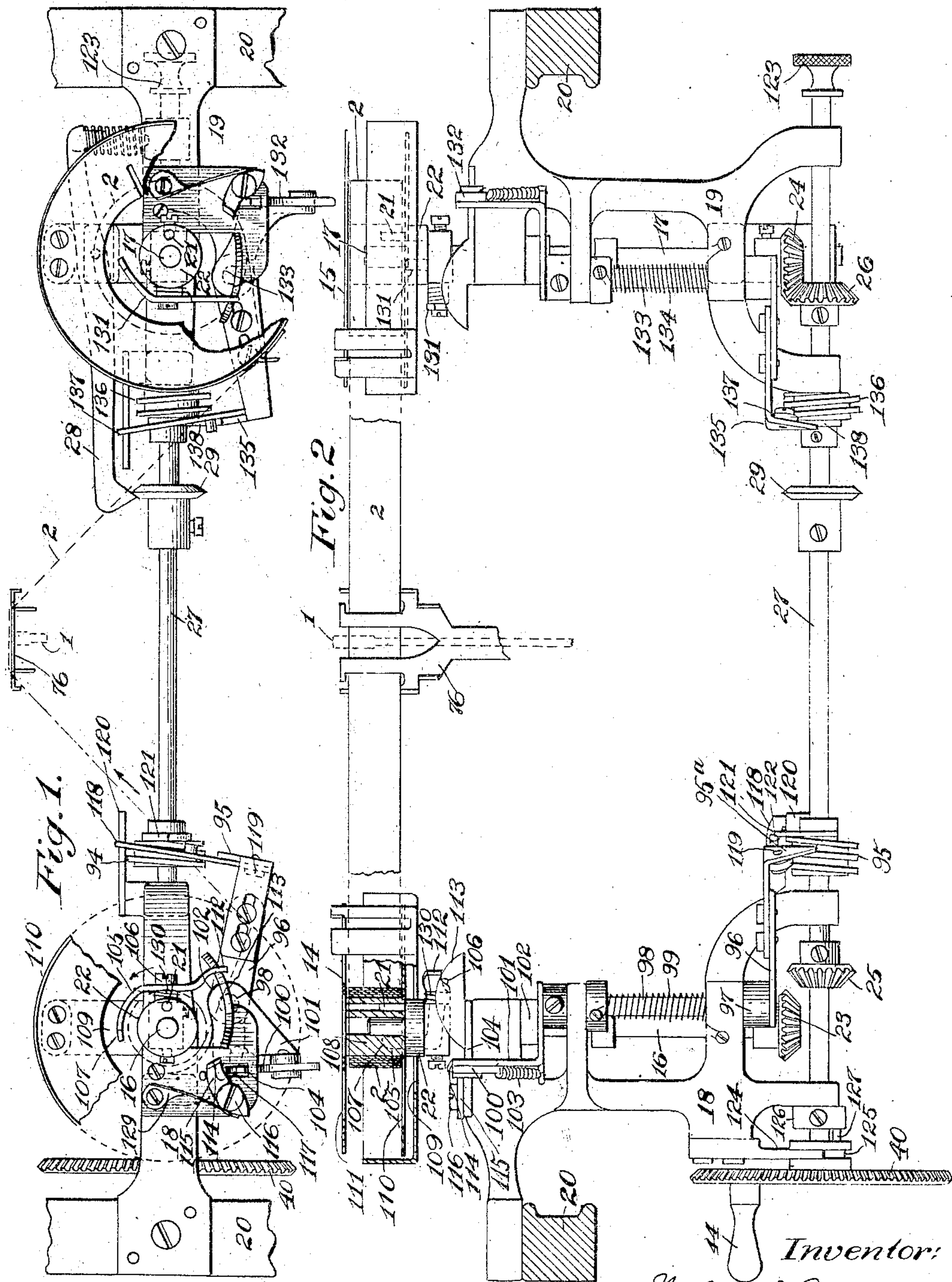
TYPE WRITING MACHINE.

APPLICATION FILED JULY 6, 1908.

959,444.

Patented May 31, 1910.

4 SHEETS—SHEET 1.



Witnesses:  
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Inventor:  
Walter E Barnard  
By his Attorney  
D C Stickney

W. E. BARNARD.  
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4 SHEETS—SHEET 2.

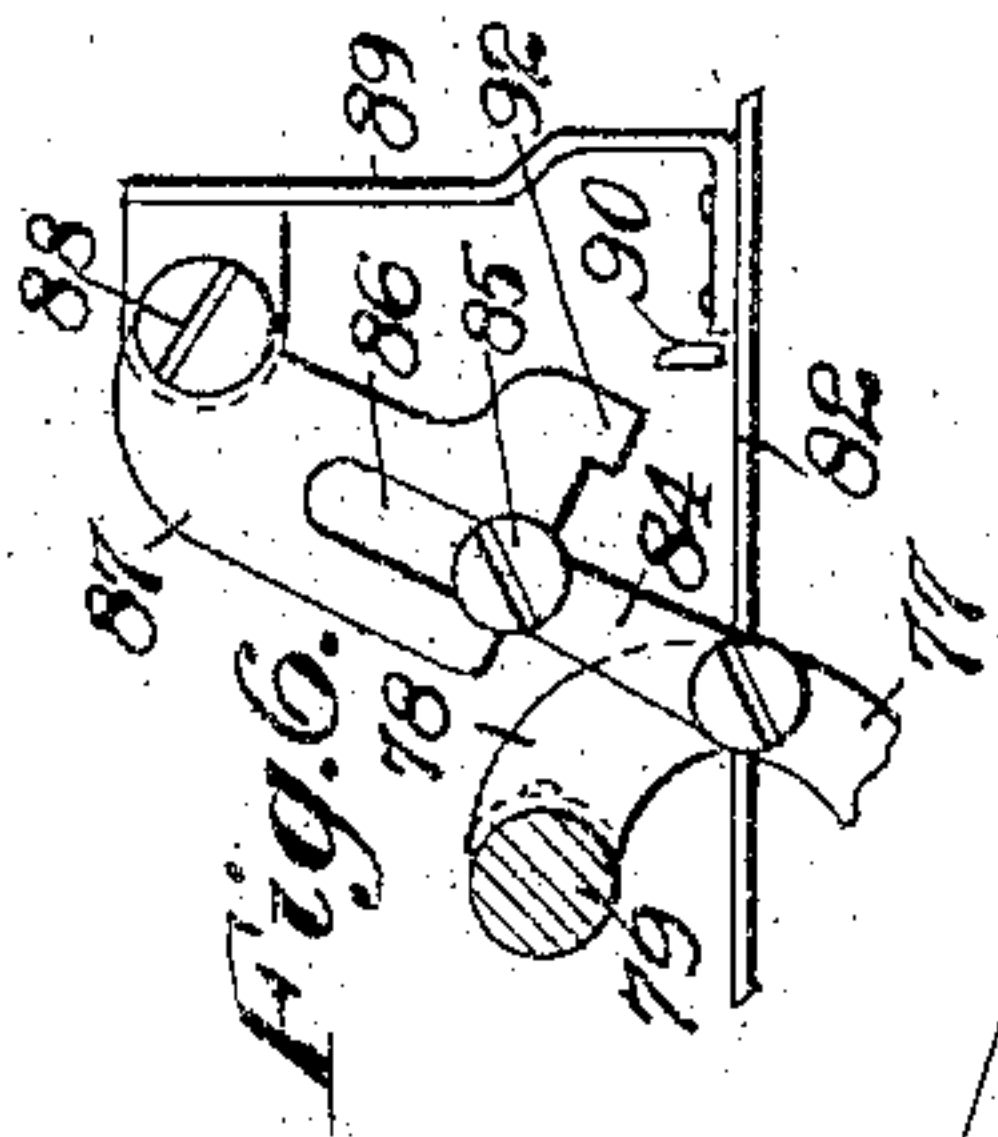


Fig. 7.

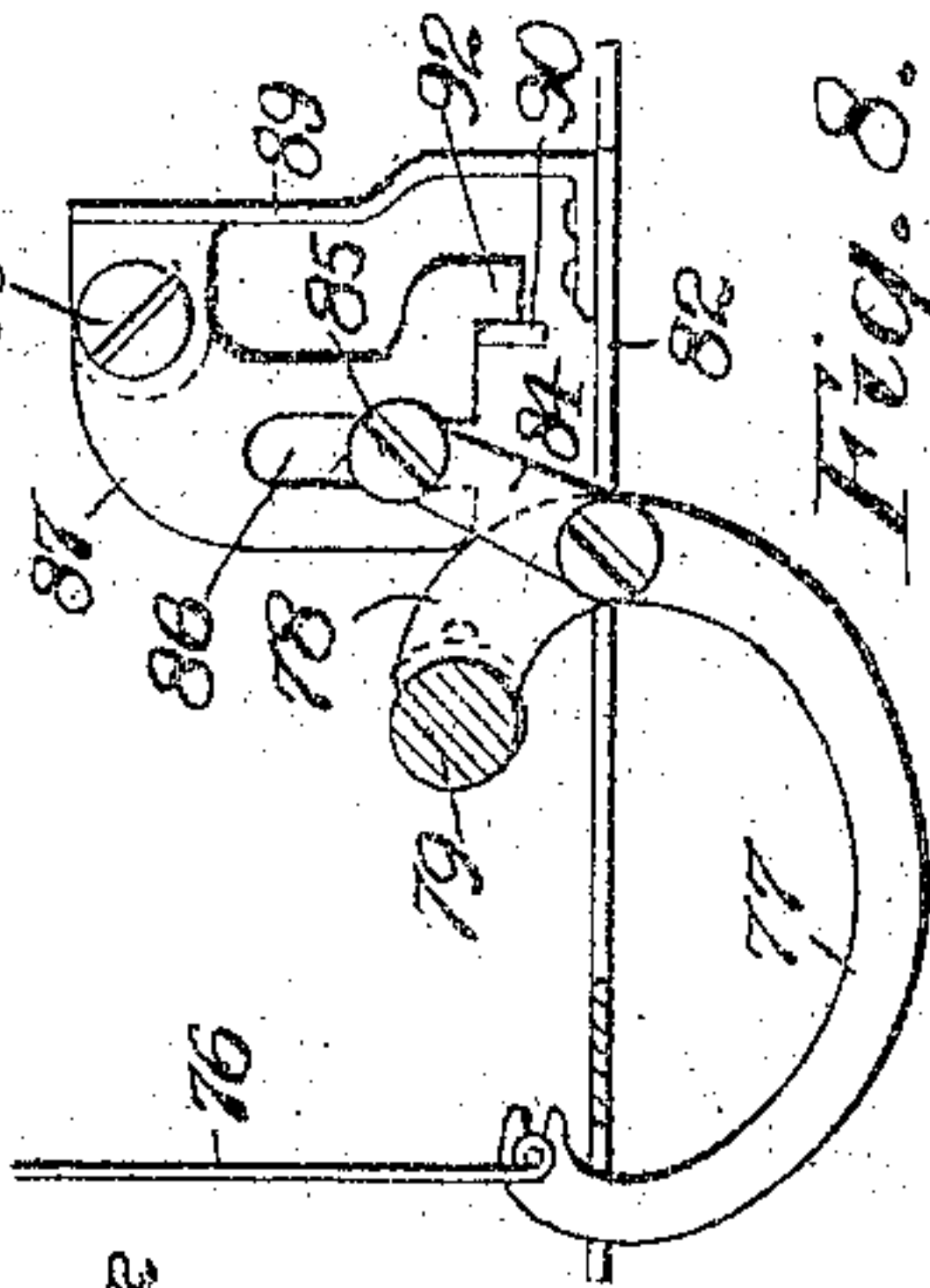


Fig. 8.

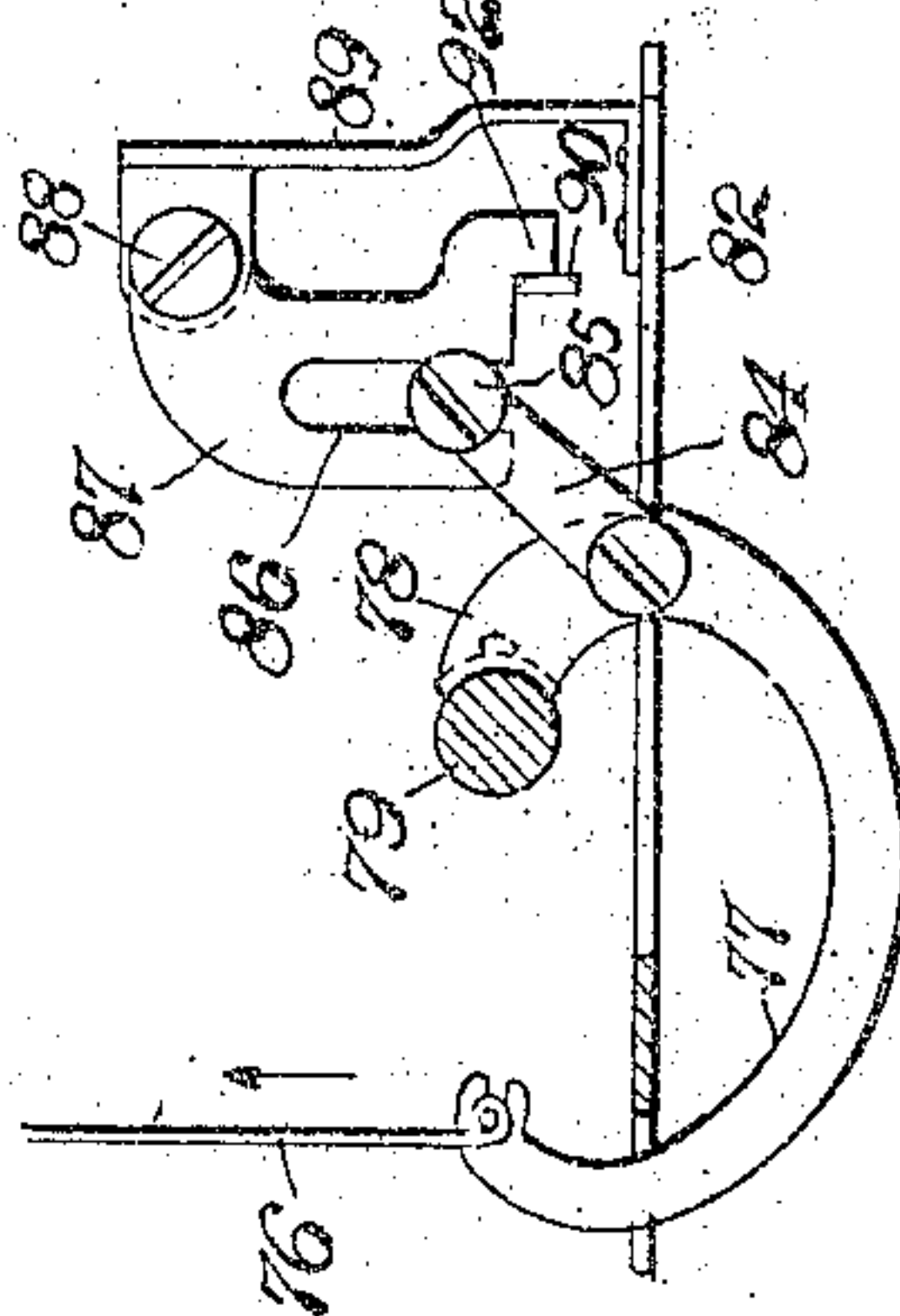


Fig. 3.

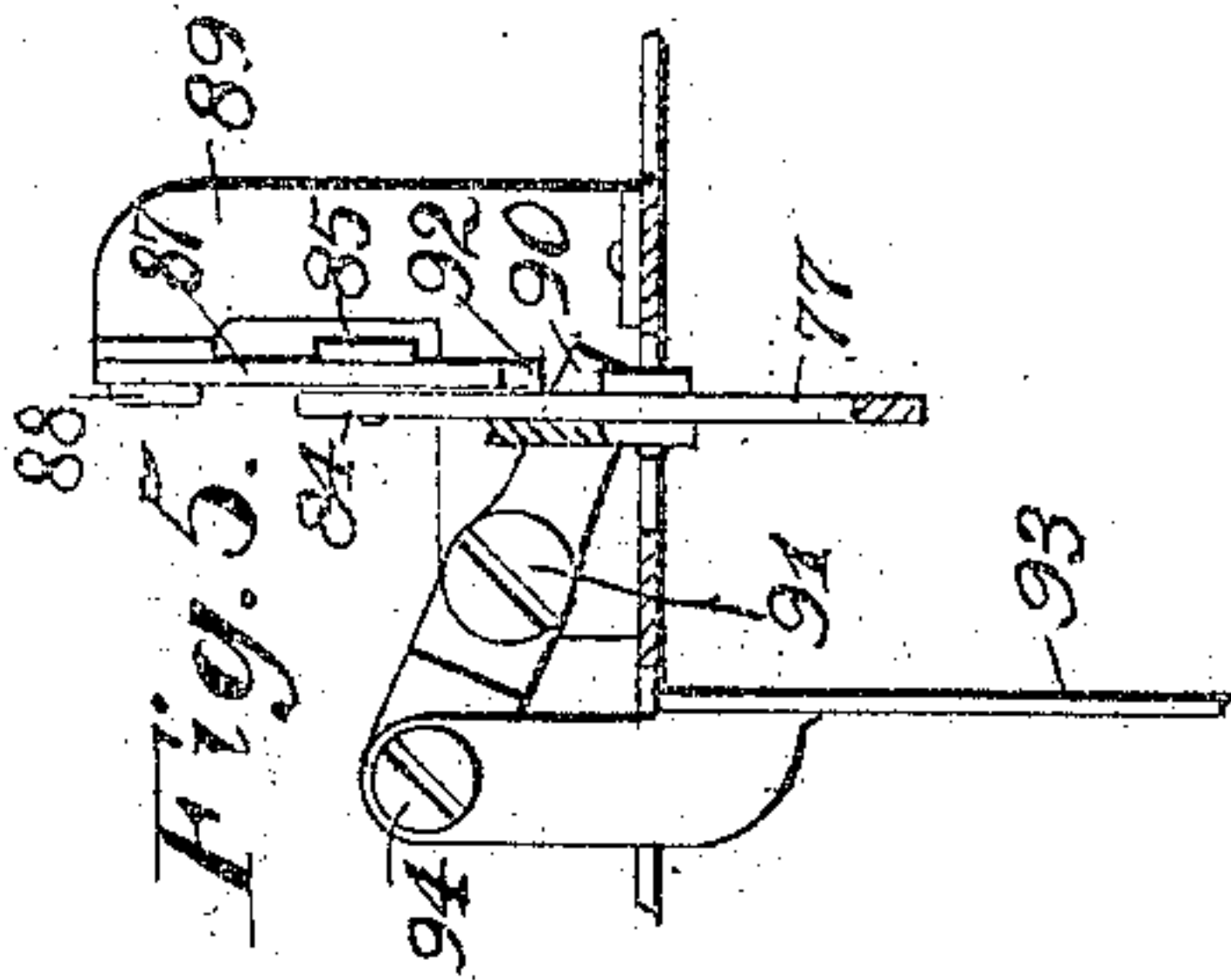
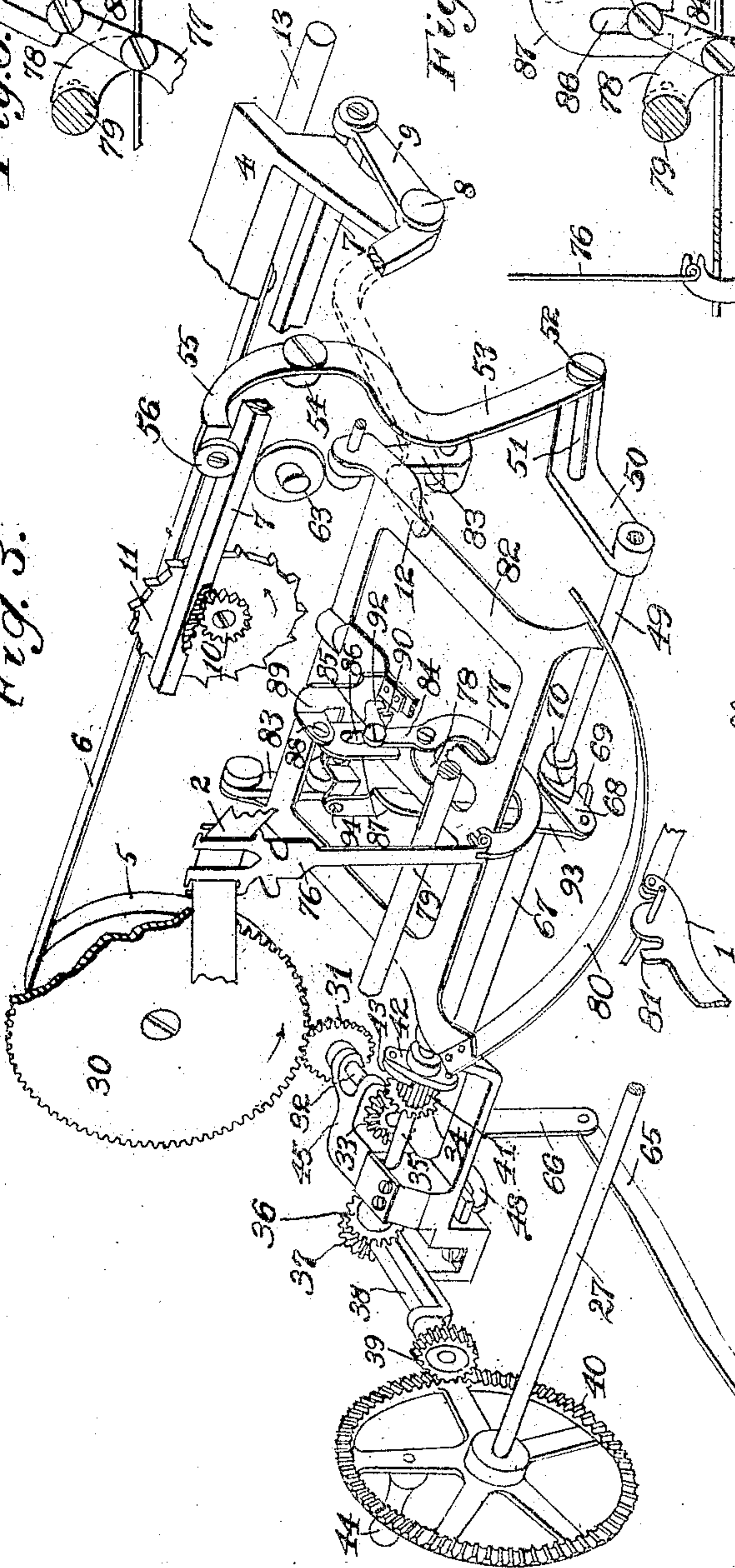


Fig. 5.

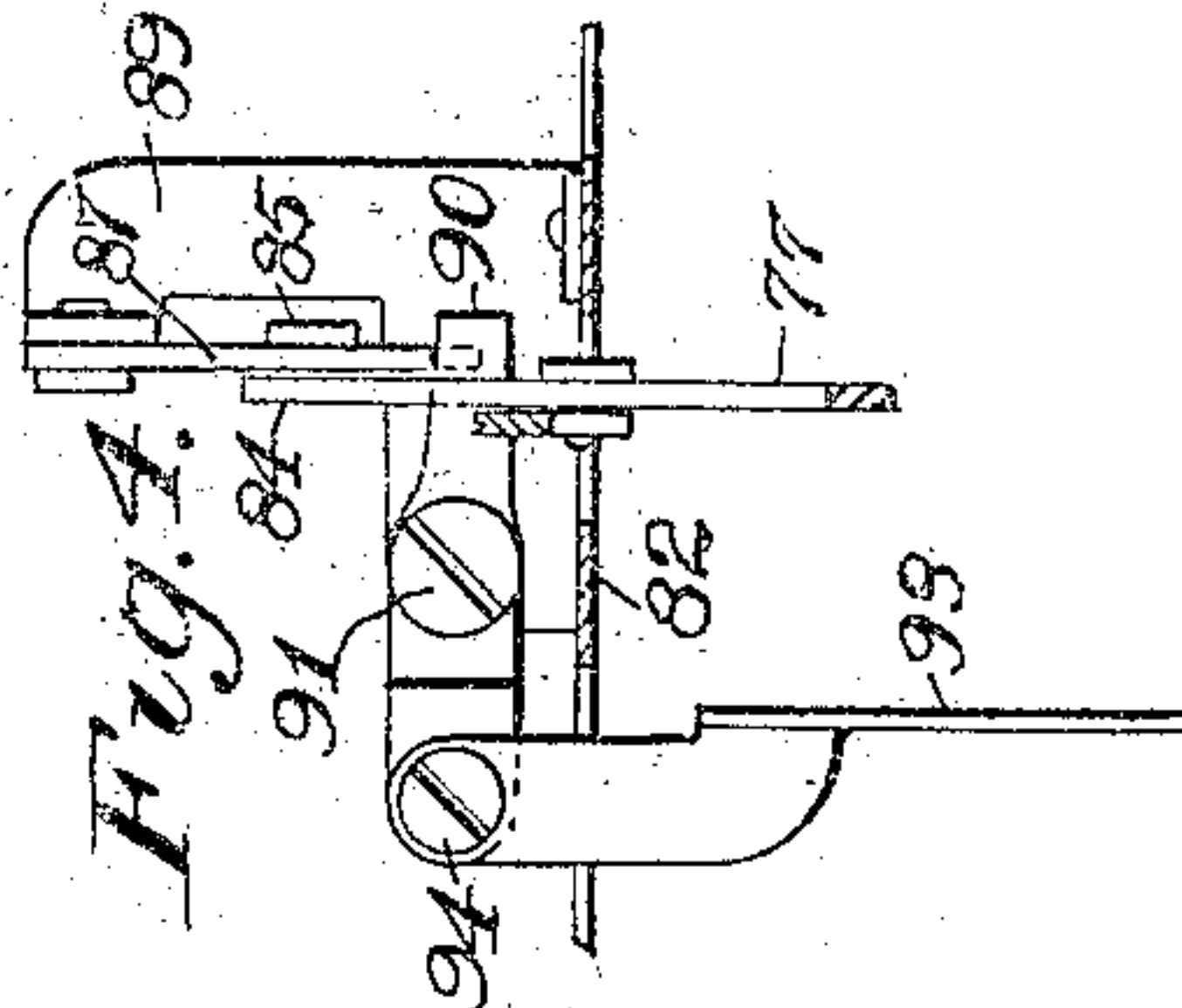


Fig. 4.

Witnesses

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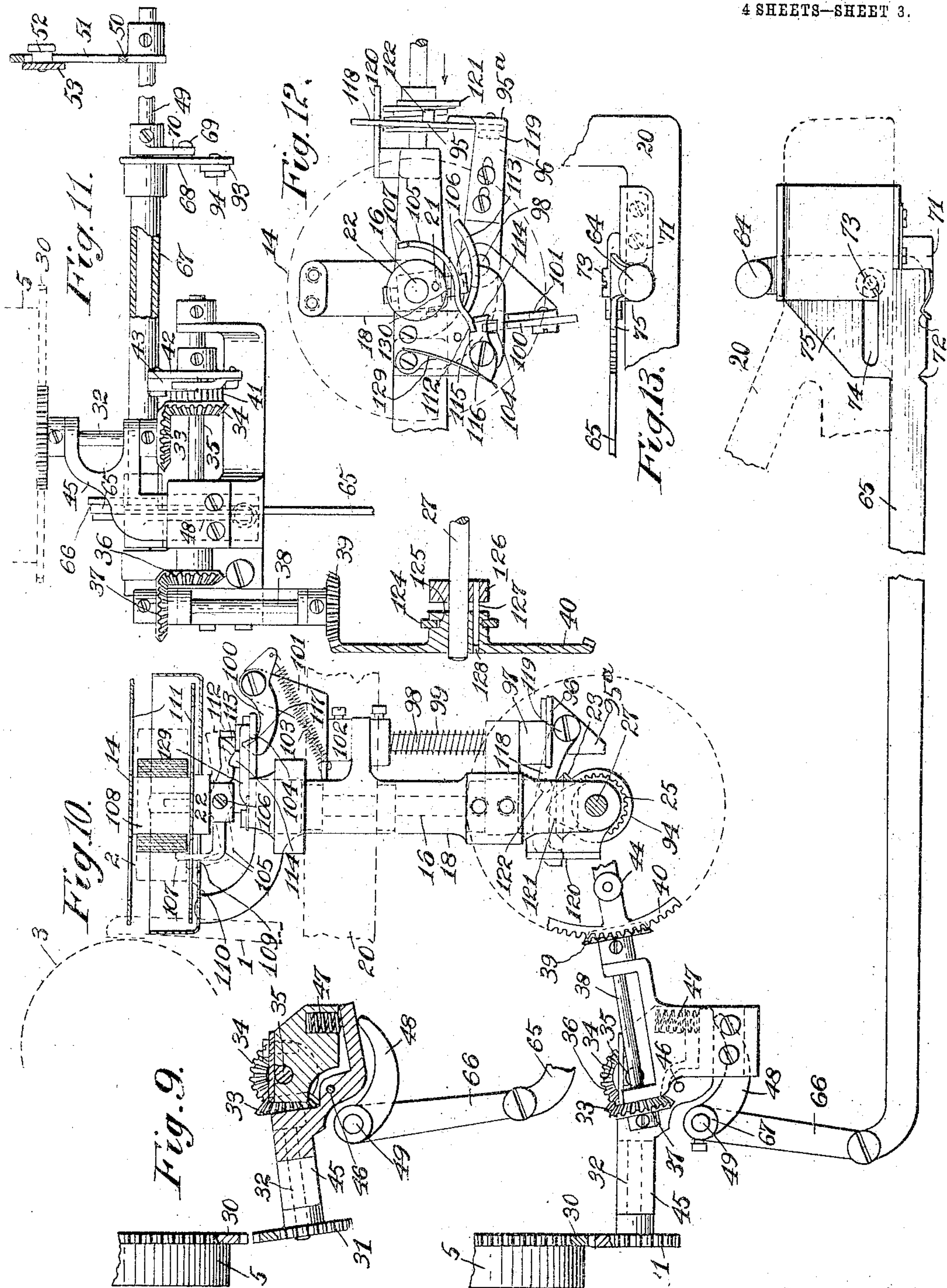


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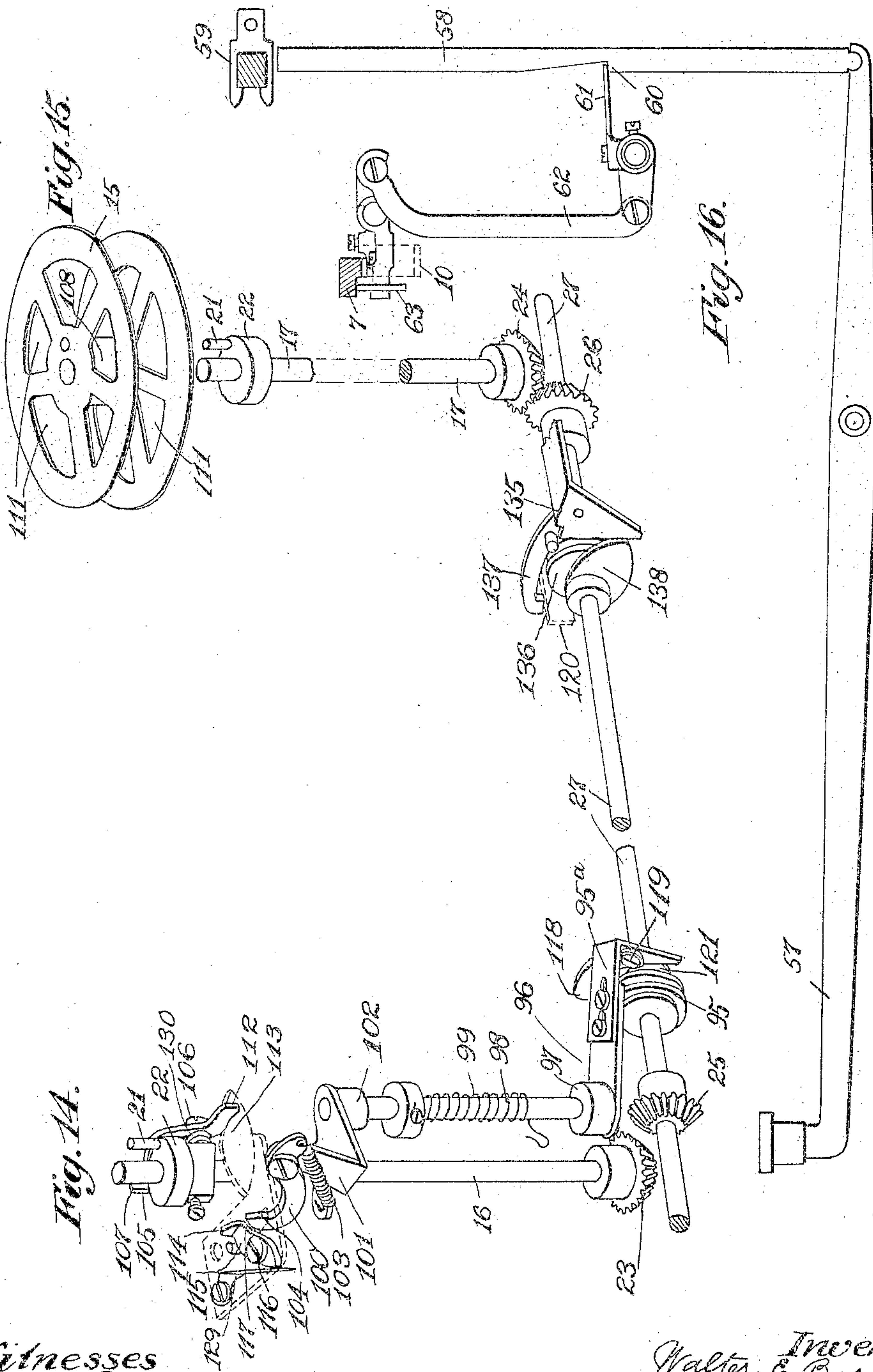
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4 SHEETS—SHEET 4.



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# UNITED STATES PATENT OFFICE.

WALTER E. BARNARD, OF HARTFORD, CONNECTICUT, ASSIGNOR TO UNDERWOOD TYPE-WRITER COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY.

TYPE-WRITING MACHINE.

959,444.

Specification of Letters Patent.

Patented May 31, 1910.

Application filed July 6, 1908. Serial No. 442,018.

*To all whom it may concern:*

Be it known that I, WALTER E. BARNARD, a citizen of the United States, residing in Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Type-Writing Machines, of which the following is a specification.

This invention relates to the ribbon mechanisms of writing machines, especially those in which the ribbon is vibrated to cover and uncover the printing point at each type stroke.

One of the main objects of the invention is to provide simple, inexpensive and conveniently operated means for silencing the ribbon vibrator when it is desired to use the machine for writing stencils. In carrying out this feature of the invention, a ribbon actuator is pivoted to the universal bar frame (which vibrates at the key strokes), and a lock is provided upon the universal bar frame to prevent said actuator from turning about its pivot. Thus when the lock is released, the actuator may swing idly during the reciprocations of the universal bar, so that no movement is imparted to the ribbon vibrator; while when the actuator is locked, it reciprocates with the universal bar and vibrates the ribbon up and down to cover and uncover the printing point. The lock is suitably connected to a key or finger-piece mounted in a position convenient to the keyboard. Said finger-piece also controls means to silence the ribbon-winding mechanism, so that objectionable feeding of the ribbon during the writing of stencils is avoided.

Another main object of the invention is to make provision for the ribbon to be wound by the action of the usual carriage-driving spring, without incurring the drawbacks heretofore experienced with such mechanism, the principal of which has been due to the relatively rapid movement of the ribbon during the rapid running of the released carriage in letter-feeding direction, as when tabulating or when performing other operations. To this end, I connect to the carriage-releasing means a device which also releases the ribbon spools from the control of the carriage spring, so that the ribbon does not wind when the carriage is released. This provision is of special importance in cases where the ribbon feed is

automatically reversed, since it has been found in practice that the rapid movement of a carriage-driven ribbon, set up when the carriage is released, is obnoxious and sometimes fatal to the proper working of the automatic ribbon-reversing mechanism; the ribbon in the ribbon-vibrating class of machines being usually frail and sometimes rupturing under the sudden strain occurring when the ribbon-reversing devices chance to operate during the rapid running of the released carriage.

The aforesaid improvements are shown in connection with a novel ribbon-reversing mechanism which is simple, inexpensive and applicable to existing machines with a moderate amount of alteration therein. The movements of the ribbon-reversing devices are controlled by means of a follower riding upon the coils of ribbon, to set the reversing devices into operation when the spool becomes empty. Objections that have heretofore existed to the use of followers are largely overcome by my invention. The follower is mounted upon the winding shaft to turn with the spool, and bears against the edges of the coils of ribbon, and in no wise interferes with the detachment or attachment of the spool to the winding shaft. To avoid liability of the follower being wrapped up within the coils, and for other purposes, I contrive to separate the follower from the coils at each revolution of the spool, whereby all liability of fouling of the ribbon or of the follower is avoided. When the coils of ribbon are paid off from the spool, the follower is permitted to enter the spool and assume a position to release a latch during the rotation of the spool, and thus permits the operation of the automatic devices to shift the usual driving shaft.

Other features and advantages will hereinafter appear.

In the accompanying drawings, Figure 1 is a plan and Fig. 2 a front elevation of the ribbon spools, the main driving shaft, etc. Fig. 3 is a front perspective view, showing portions of the paper carriage, the initial ribbon-driving gear and its connections, the ribbon vibrator and the universal bar frame and connections. Fig. 4 is a front elevation showing in normal or locked position the lock for causing the ribbon to be vibrated at the type strokes. Fig. 5 is a similar view to Fig. 4, but shows the lock released, so



that the ribbon remains stationary or idle at the type strokes. Fig. 6 is a sectional side elevation illustrating the universal bar as having been moved back at the printing stroke of the type bar, and the ribbon-vibrating actuator as having swung idly about its pivot on the universal bar frame. Fig. 7 is a sectional side elevation similar to Fig. 6, and showing the parts all in normal positions. Fig. 8 shows the universal bar in the same position, as at Fig. 6, and illustrates the manner in which the locked actuator thrusts up the ribbon vibrator at the type strokes. Fig. 9 is a sectional side elevation showing a fragment of the initial drive-gear of the ribbon-winding mechanism, and also showing the manner in which it is disconnected from the remainder of the winding mechanism. Fig. 10 is a part sectional side elevation showing principally the left hand ribbon spool and the gearing between the carriage spring barrel and the main ribbon-winding shaft, and also the finger-piece at the keyboard for silencing the ribbon-winding mechanism and the ribbon vibrator. Fig. 11 is a part sectional plan, showing the gears extending from the spring-driving barrel to the main ribbon winding shaft and connected parts. Fig. 12 is a plan showing the same parts as in the left hand portion of Fig. 1, but illustrating the automatic operation of shifting the main transverse ribbon driving shaft to connect with the left hand spool. Fig. 13 is a plan of the left hand front corner of the machine, showing the ribbon-controlling key. Fig. 14 is a perspective view of the ribbon reversing mechanism. Fig. 15 is a perspective of a ribbon spool; and Fig. 16 is a sectional side elevation of a tabulating mechanism including a carriage rack which is connected to the ribbon operating mechanism.

In the Underwood front strike writing machine, type bars 1 strike through a ribbon 2 against the front side of a platen 3, the latter suitably mounted upon a carriage, of which a part is seen at 4. The carriage is propelled by a spring-barrel 5 by means of a strap 6. A rack 7 is hinged upon the carriage at 8 by means of a pair of arms 9, and meshes with a pinion 10 connected to an escapement wheel 11. The rack is releasable by a key 12 fixed to one of the arms 9, the depression of said key swinging up the rack to separate it from the escapement pinion 10, so that it may be drawn along by the spring-barrel 5. The carriage runs upon the usual rails, one of which is seen at 13. Said ribbon 2 is wound upon a pair of similar spools 14, 15, detachably mounted upon vertical shafts 16, 17, mounted in brackets 18, 19, supported upon the framework 20 of the machine. The spools have central perforations to fit on the tops of the shafts, and are also perforated to fit upon dowel-

pins 21 projecting up from supporting collars 22 fixed on the shafts, whereby the spools are caused to rotate. At their lower ends, the spool-shafts carry miter gears 23, 24, to mesh alternately with similar gears 25, 26, fixed upon the main transverse horizontal driving shaft 27, the latter shiftable endwise to connect to either spool-shaft, and held in either position by a spring detent 28 engaging a double beveled collar 29 fixed upon the main shaft 27. The parts so far specified are in common use on said Underwood machine. The ribbon-winding devices also include an initial drive-gear 30 fixed upon the carriage driving spring barrel 5, and meshing with a pinion 31, the latter connected by a forwardly extending shaft 32 to a bevel pinion 33, meshing with a bevel pinion 34. This pinion 34 is loosely mounted upon a transverse shaft 35, and the latter is connected by bevel pinions 36, 37 to another forwardly extending shaft 38, which carries at its forward end a bevel pinion 39, meshing with a gear 40 on the left hand end of the main transverse driving shaft 27. It will be seen that the pinion 34 is fixed to a ratchet wheel 41, both these members being loose upon the shaft 35; and that said shaft carries a fixed arm 42 upon which is pivoted a pawl 43 to engage said ratchet wheel; thus permitting the spring barrel to turn back without winding the ribbon during the return of the carriage to begin a new line. This arrangement also permits the ribbon to be wound manually independently of the carriage spring, by means of a handle 44 upon the gear 40.

Disconnection may be effected between the initial drive-gear 30 and the pinion 31, the latter being mounted for this purpose upon an arm 45 hinged at 46 upon the framework of the machine. The arm 45 may be turned down as at Fig. 9, to drop the pinion away from the gear; and a compression spring 47 is provided for returning the arm and pinion to normal positions. It will be seen that during this swinging movement, the pinion 33 remains in mesh with the pinion 34. The described disconnection or release of the pinion 31 may be effected by an arm 48 fixed upon a transverse horizontal rock-shaft 49, suitably mounted upon the framework and carrying at its other end an arm 50, having a cam-slot 51 engageable by a screw or pin 52 formed upon the lower free end of a lever arm 53. Said lever arm is pivoted upon the framework at 54, so that by a swinging movement forwardly and backwardly, the arm 50 may be cammed down to rock the shaft 49 and disconnect the pinion 31. Said lever is provided with an upper arm 55 having a roll 56 to run upon the releasable carriage rack 7, so that when the latter is lifted from the pinion 10, the lever 53, 55 is vibrated, and the arm 50 is



rocked, and the pinion 31 disconnected from the drive-gear 30, thus silencing the ribbon-winding mechanism during the rapid run of the carriage in letter feeding direction.

5 This carriage rack is frequently released by means of a tabulator-key 57 operating a denominational stop rod 58 to engage a column stop 59 upon the carriage; said column stop rod having a lug 60 to operate a frame or arm 61, which in turn operates a lever 62 carrying a roll 63, which lifts the rack when the tabulator key is operated. Thus during the rapid movement of the carriage in tabulating the ribbon is not fed, and liability is avoided of injury thereto, or to the ribbon-winding mechanism, as well as liability of faulty action of the automatic feed-reversing mechanism. This silencing of the ribbon-winding mechanism may be performed not only by the carriage release key 12 and the tabulator key 57, but also by a key or finger-piece 64 arranged at the keyboard of the machine upon the forward end of a link 65.

15 The finger-piece 64 may be pulled forwardly, acting through said link to swing forwardly a crank 66 which depends from a sleeve 67 loosely surrounding the rock-shaft 49, and carrying at its other end an arm 68 having a lug 69 to engage a crank 70 fixed upon the rock-shaft 49. The finger-piece 64 therefore pulls the link 65, swings the crank 66, sleeve 67, and arm 68, and by means of the lug 69 turns the crank 70, and hence the rock-shaft 49, to lift the arm 48 and depress the pinion 31, Fig. 9. A spring detent 71 engages either of two notches 72 in the link 65 to hold the parts in either the Fig. 10 position or the Fig. 9 position. The forward end of the link 65 is supported on a pin 73, by means of a horizontal slot 74 cut in an enlargement 75 of the link. Said finger-piece 64 is used not only to silence the winding mechanism, but also to silence the ribbon-vibrating mechanism, the latter including the usual upstanding vibrator or ribbon carrier 76 and a lever 77 operating the same, said lever mounted on a bracket 78 projecting from a platen shift rail 79, as usual.

25 The ribbon vibrating movements are effected through a universal bar 80, which at every type stroke is engaged and pushed back by a heel 81, on the type bar. Said universal bar forms part of a frame 82 suitably supported in front, and in rear mounted upon links 83. The universal bar operates the usual carriage feed dogs (not shown). Upon an upstanding arm 84 of said ribbon-vibrating lever 77, is provided a wrist 85, to engage a slot 86 formed in an actuator 87 mounted upon the reciprocating universal bar frame. The slot 86 permits the shifting up and down of the lever 84, 77, together with the shift rail 79, at the case-shifting movements of the platen 3.

The actuator 87 may either swing idly about its pivot 88, by which it is mounted upon an upstanding arm 89 fixed upon the universal bar frame 82 (Fig. 6) or it may move backward and forward with the universal bar (Figs. 7 and 8). In the first case, the ribbon-vibrating lever 77 will remain stationary at the type strokes; while in the other case, said lever will be active at the type strokes to vibrate the ribbon up and down to cover and uncover the printing point. This difference in the action of the actuator 87 is effected by means of a locking lever 90, pivoted at 91 upon the arm 89 to swing up in front of a lug 92 formed on the lower end of the actuator 87, that is, the end opposite the pivot 88, as at Figs. 3, 4, 7 and 8. When the lock 90 is depressed, Figs. 5 and 6, the universal bar frame 82 no longer controls or operates the actuator 87, and the latter hence swings idly about the pivot 88 while remaining in connection with the wrist 85. This effect is shown at Fig. 6, in which the universal bar frame 82 is in its rear position, that is, the position occupied by it at the completion of the printing stroke of the type bar. When however the lever 90 is up in normal position, the actuator moves with the universal bar from the Fig. 7 to the Fig. 8 position at each printing stroke, thereby lifting the ribbon vibrator 76. The lever lock 90 is controlled by said feed-silencing key 64; a link 93 being pivoted at its upper end at 94 to an arm of said lever 90, and at its lower end to the arm 68 controlled by said key 64, in the manner already described. Thus said key 64 when moved forwardly from the Fig. 10 position simultaneously silences both the ribbon-vibrating mechanism and the ribbon-feeding mechanism, and the detent 71 holds it in this position, so that the uninked types may be used for writing stencils, etc., without any movement on the part of the ribbon.

The mechanism for reversing the feed of the ribbon comprises a worm 95 fixed upon the endwise shiftable main driving-shaft 27, and a tumbler 95<sup>a</sup> to engage said worm, said tumbler mounted upon an arm 96, the latter fixed by means of a hub 97 upon the lower end of a vertical rock shaft 98, alongside the spool-shaft 16; a spring 99, surrounding said rock-shaft and detent, tending constantly to swing the tumbler 95<sup>a</sup> into mesh with the worm 95. This movement of the tumbler is normally prevented by a latch 100 (Fig. 10) which is pivoted upon an arm 101 fixed by a hub 102 upon the upper end of said vertical shaft 98. A draw-spring 103 normally holds said latch in engagement with a catch 104 fixed upon the machine frame. It will be understood that when said latch is released, the shaft 98 is caused by the spring 99 to swing the tumbler 95<sup>a</sup> into engagement with the worm



95, so that the rotation of the latter may force the rotating shaft 27 longitudinally to the left to cause the gear 25 to move to or toward the gear 23; the final portion of such endwise movement of the shaft being effected by the movement of the spring detent cam 28 acting on the bevel collar 29. Said latch 100 is automatically released when the ribbon is all paid off from the spool 14, by the following means: A follower 105 is pivoted at 106 to the lower portion of the collar 22 on the shaft 16, and has a nose 107 which bears up against the edges of the coils of ribbon 2 wound upon the spool core 108. Said nose 107 extends up through an opening 109 in the bottom of the usual spool cup 110, and also up through any one of a series of openings 111, formed in the flanges of the spool, the latter as usual being mountable either side up upon the shaft 16. The follower is counter-weighted by means of an arm 112, so that the nose 107 tends constantly to rise within the spool.

To prevent the ribbon from becoming fouled, and the nose 107 from becoming wrapped up in the coils of ribbon, I contrive to withdraw said nose from the coils once in each revolution of the spool; this operation being effected by a cam 113, which is fixed upon the framework in the path of said arm 112, to turn the follower to the dotted line position at Fig. 10. The cam is two sided, as shown best at Fig. 2, to operate the arm 105 when the spool is rotated in either direction.

It will be understood that the follower repeatedly taps against the ribbon coils during the winding or unwinding of the ribbon from the spool; but that no function is performed by said follower until the coils of ribbon become all or nearly all paid off, as at Fig. 10, so that the nose 107 is permitted to penetrate the spool, as shown in full lines at Fig. 10. In this position of the follower, the arm 112 is enabled to engage a lip 114 formed on a lever 115 pivoted at 116 upon the framework as at Fig. 12, and to swing said lever forwardly to engage a cam edge 117 formed on the tooth of the latch 100, thereby camming said latch down, and releasing it from the fixed catch 104, so that the spring 99 may swing the tumbler 95<sup>a</sup> into engagement with the shaft-shifting worm 95. When the tumbler 95<sup>a</sup> engages the worm 95, a second latch 118 pivoted at 119 on said tumbler drops over a catch 120 fixed upon the stationary bracket 18, to hold the tumbler in engagement with the worm, so that there is no liability of the tumbler being pushed to one side by the pressure of the worm thereon. As before explained, the shaft 27 is thrust to the left to engage the gears 23 and 25 and rewind the ribbon upon the spool 14.

Fixed to the right hand end of the worm

95 is a cam 121, which comes into play as soon as the shaft 27 is shifted to the left, to engage a lug 122 on the latch 118, and lift the latch from the fixed catch 120, thereby releasing the tumbler 95<sup>a</sup>. Said cam 121 thereupon engages the rear or active edge of said tumbler, and presses the same forwardly away from the worm sufficiently to enable the first latch 100 to become caught upon the catch 104; this bringing the parts in position to be reactuated the next time the spool 14 becomes empty. It will also be perceived that the shaft 27 may be shifted endwise by a button 123, and also that the gear 40, which is loosely mounted upon the shaft 27, is held against axial movement by means of a detent 124 fixed upon the stationary bracket 18 and engaging a peripheral groove 125 formed in the hub of said wheel. A collar 126 is fixed upon the shaft to carry a pin 127 extending into a hole 128, Fig. 11, parallel with the shaft 27 to enable the gear 40 to turn the shaft. Said lever or interponent 115, after releasing the latch 100, is swung to one side by the advancing arm 112 of the follower; and as soon as the lever escapes from said arm, it is returned to normal position by a spring 129. In addition to the counterweight of the arm 112, the follower may be provided with a spring 130, Fig. 1, to tend constantly to throw the nose 107 up into the spool.

As soon as engagement is automatically effected between the gears 20 and 25 in the manner already described, the spool 14 begins to turn in the opposite direction, the ribbon rewinding upon the core, and arm 112 of the follower riding idly over the cam 113, thus withdrawing the nose 107 from the coils at every revolution of the spool, and permitting the same to bear against the coils at corresponding intervals; this idle vibration of the follower continuing during the winding and subsequent unwinding of the ribbon.

The described movement of the shaft 27 to the left separates the gear 26 from the gear 24, and permits the ribbon to pay off from the spool 15 as it winds on the spool 14. When the spool 15 becomes empty the shaft 27 moves automatically to the right to separate the gear 23, and reengage the gears 24 and 26 to rewind the ribbon on the spool 15. This automatic movement of the shaft 27 to the right is effected in the same manner as its movement to the left hereinbefore described; the spool 15 being provided with a follower 131 to release a latch 132 carried upon a vertical shaft 133, which is turned by a spring 134 to swing a tumbler 135 into engagement with a worm 136 fixed on said shaft 27; said worm having a retaining latch 137, and a cam 138 to lift the latch to restore the tumbler 135 to normal position.



Variations may be resorted to within the scope of the invention, and portions of the improvements may be used without others.

Having thus described my invention, I claim:

1. In a typewriting machine, the combination with a universal bar device reciprocating at the key strokes, of an actuator mounted loosely upon said universal bar device, a ribbon vibrator, releasing means mounted on said universal bar device, to enable said universal bar device to cause said actuator to operate said vibrator, and a finger-piece upon the framework of the machine having a loose connection to said releasing means, to permit the latter to move with the universal bar while the finger piece remains stationary.

2. In a typewriting machine, the combination with a universal bar frame or device, of an actuator swiveled thereon, a ribbon-vibrating device permanently engaged by said actuator, and a lever pivoted upon said universal bar device to releasably lock said actuator to the universal-bar device to cause the actuator to operate said ribbon-vibrating device.

3. In a typewriting machine, the combination with a universal bar device reciprocating at the key strokes, of an actuator mounted loosely upon said universal bar device, a ribbon vibrator permanently connected to said universal bar device, releasing means to enable said universal bar device to cause said actuator to operate said vibrator, and a finger-piece for said releasing means.

4. In a typewriting machine, the combination with a universal bar frame or device, of an actuator swiveled thereon, a ribbon-vibrating device engaged by said actuator, a lever pivoted upon said universal bar device to lock and release said actuator, a link connected to said releasing means, and an arm pivoted upon the framework and connected to said link.

5. In a typewriting machine, the combination with a universal bar frame or device, of an actuator swiveled thereon, a ribbon-vibrating device engaged by said actuator, a lever pivoted upon said universal bar device to lock and release said actuator, a link connected to said releasing means, an arm pivoted upon the framework and connected to said link, and a finger-piece upon the framework and connected to said arm.

6. In a typewriting machine, the combination with a universal bar device reciprocating at the key strokes, of an actuator mounted loosely upon said universal bar device, a ribbon vibrator permanently connected to said universal bar device, releasing means to enable said universal bar device to cause said actuator to operate said vibrator, a finger-piece for said releasing means, and

means for holding said finger-piece in position either to lock or release said actuator.

7. In a typewriting machine, the combination with a universal bar frame which reciprocates at the type strokes, of an actuator pivoted upon said frame, a ribbon vibrating lever engaging said actuator, a locking lever pivoted upon the universal bar frame to engage said actuator to enable the universal bar frame to cause said actuator to operate said ribbon-vibrating lever, and a detent to hold said lever in either effective or ineffective position.

8. In a typewriting machine, the combination with a universal bar device which reciprocates at the type strokes, of a ribbon-vibrating lever, an actuator pivoted upon said universal bar device, and means for causing said actuator either to swing idly upon its pivot at the type strokes or to vibrate said lever at the type strokes, at will.

9. In a typewriting machine, the combination of a rock shaft mounted upon the framework and having a crank, a member connected to said crank and having a key or finger-piece, a link extending from the crank, a lever connected to the link and pivoted upon a universal bar which is reciprocated at the key strokes, a lock operated by said lever, an actuator swiveled upon said universal bar to be either released or locked by said lock, a ribbon-vibrating lever connected to said actuator, and means for detaining the finger-piece in either actuator-locking or actuator-releasing position.

10. In a typewriting machine, the combination of a rock shaft mounted upon the framework and having a crank, a member connected to said crank and having a key or finger-piece, a link extending from the crank, a lever connected to the link and pivoted upon a universal bar which is reciprocated at the key strokes, a lock operated by said lever, an actuator swiveled upon said universal bar to be either released or locked by said lock, a ribbon vibrating lever connected to said actuator, means for detaining the finger-piece in either actuator-locking or actuator-releasing position, a carriage, a spring to drive said carriage, a ribbon-feeding mechanism actuated by said spring, and means connected to said key to release the ribbon-feeding mechanism from said spring when the vibrator actuator is released, so that the ribbon may neither feed nor vibrate.

11. In a typewriting machine, the combination with a case-shift rail, a lever fulcrumed thereon, and a ribbon vibrator operated by said lever, of a universal bar reciprocating at the key strokes, an actuator having a slot engaged by a wrist on said lever, said slot constructed to accommodate the shifting movement of the rail and lever, and said actuator pivoted upon said uni-



versal bar frame, and a releasable lock for the actuator to cause it either to move rigidly with the universal bar frame or to swing idly about its pivot during the reciprocations of said frame.

12. In a typewriting machine, the combination with a case-shift rail, a lever fulcrumed thereon, and a ribbon vibrator operated by said lever, of a universal bar reciprocating at the key strokes, an actuator having a slot engaged by a wrist on said lever, said slot constructed to accommodate the shifting movement of the rail and lever, and said actuator pivoted upon said universal bar frame, and a releasable lock for the actuator to cause it either to move rigidly with the universal bar frame or to swing idly about its pivot during the reciprocations of said frame, said wrist standing in said slot normally near one end of the actuator, and the latter being pivoted at its other end.

13. In a typewriting machine, the combination with a universal bar frame reciprocating at the key strokes, a ribbon vibrating device permanently connected to said universal bar frame, a releasable lock mounted upon said universal bar frame for causing the universal bar to operate said vibrating device, and a key upon the framework and loosely connected to said lock.

14. In a typewriting machine, the combination with a universal bar reciprocating at the type strokes, of a ribbon carrier, a lever to vibrate the ribbon carrier, an actuator swiveled on said universal bar to permit the latter to reciprocate while the lever remains idle, and a lock mounted upon said universal bar to engage the actuator, to cause the same to move rigidly with the universal bar, and thereby vibrate the lever and ribbon carrier, a link connected to said lock, and a lever mounted upon the framework of the machine and so connected to said link as to permit the latter to vibrate idly during the reciprocation of the universal bar.

15. In a typewriting machine, the combination with a universal bar device reciprocating at the key strokes, of an actuator mounted loosely upon said universal bar device, a ribbon vibrator operated by said actuator, releasing means mounted on said universal bar device, to cause said actuator to move rigidly with said universal bar device, a finger-piece upon the framework of the machine having a loose connection to said releasing means, to permit the latter to move with the universal bar while the finger-piece remains stationary, spool-winding means, and means connected to said finger-piece to silence said spool-winding means.

16. In a typewriting machine, the combination with a universal bar frame or device, of an actuator swiveled thereon, a ribbon-vibrating device engaged by said actuator, a

lever pivoted upon said universal bar device to lock or release said actuator, a link connected to said releasing means, an arm pivoted upon the framework and connected to said link, a ribbon-winding mechanism, and means connected to said arm to silence the ribbon winding mechanism when the actuator is released.

17. In a typewriting machine, the combination with a ribbon-winding mechanism, of a rock shaft mounted upon the framework and having a crank, means operable by said rock shaft to silence said ribbon-winding mechanism, a member connected to said crank and having a key or finger-piece, a link extending from the crank, a lever connected to the link and pivoted upon a universal bar which is reciprocated at the key strokes, a lock operated by said lever, an actuator swiveled upon said universal bar to be either released or locked by said lock, a ribbon-vibrating lever connected to said actuator, and means for detaining the finger-piece in either actuator-locking or actuator-releasing position.

18. In a typewriting machine, the combination with a carriage, of a spring to drive the carriage, a gear driven by said spring, a pinion meshing with said gear, ribbon-winding devices operated by said pinion, a rock shaft (as 67) having means to separate the pinion from the gear, a finger-piece to turn the rock shaft, ribbon-vibrating mechanism, and means connected to said rock shaft to silence the ribbon-vibrating mechanism.

19. In a typewriting machine, the combination with a carriage, of a spring to drive the carriage, a gear driven by said spring, a pinion meshing with said gear, ribbon-winding devices operated by said pinion, a rock shaft (as 67) having means to separate the pinion from the gear, a finger-piece to turn the rock shaft, a universal bar device reciprocated at the key strokes, an actuator loose upon said universal bar device, a ribbon-vibrator connected to said actuator, a lock upon said universal bar device to cause said actuator normally to operate the vibrator, and means connected to said rock shaft to release said lock.

20. In a typewriting machine, the combination with a carriage, of a spring to drive the carriage, a gear driven by said spring, a pinion meshing with said gear, ribbon-winding devices operated by said pinion, a rock shaft (as 67) having means to separate the pinion from the gear, a finger-piece to turn the rock shaft, a universal bar device reciprocated at the key strokes, an actuator loose upon said universal bar device, a ribbon-vibrator connected to said actuator, a lock upon said universal bar device to cause said actuator normally to operate the vibrator, and means connected to said rock shaft to release said lock, said lock being in



the form of a lever and said rock shaft having a loose connection to said lever.

21. In a typewriting machine, the combination with a carriage and an escapement mechanism therefor, of a device to release the carriage, a spring barrel to drive the carriage, a gear upon said spring barrel, a pinion in mesh with said gear, and means connected to said carriage-releasing device to move said pinion out of mesh with said gear, said pinion journaled upon a rocking-device, a beveled pinion also mounted upon said rocking device and connected to the first pinion, a second beveled pinion meshing with the first beveled pinion and journaled on the framework and connected to a ratchet wheel, a revoluble shaft having a pawl-arm to engage said ratchet wheel, and pinions connecting said revoluble shaft to a second revoluble shaft, the latter carrying a pinion in mesh with a gear upon a main spool-driving shaft.

22. In a typewriting machine, the combination with a carriage and an escapement mechanism therefor, of a device to release the carriage from the control of the escapement mechanism, a spring to drive the carriage, a train of gearing extending from said spring to a main spool-driving shaft, certain members of said train being separable from each other, a key to effect such separation, a ribbon-vibrating mechanism, and means connected to said key to silence said ribbon-vibrating mechanism.

23. In a typewriting machine, the combination with a carriage and an escapement mechanism therefor, of a device to release the carriage from the control of the escapement mechanism, a spring to drive the carriage, a train of gearing extending from said spring to a main spool-driving shaft, certain members of said train being separable from each other, a key to effect such separation, one of said separable gear members being mounted upon a rocking arm or frame, a rock-shaft operable by said key and connected to said rocking arm or frame, a link extending from a crank on said rock shaft, a ribbon-vibrator connected to a universal bar which reciprocates at the type strokes, and a releasable device connected to said link and mounted on said universal-bar frame, for enabling the latter to cause the ribbon to vibrate.

24. In a typewriting machine, the combination with a carriage, an escapement mechanism therefor including a rack, of a spring for driving the carriage, a spool-winding mechanism driven by said spring, and means to be operated by the rack at the release thereof, to disconnect said ribbon-winding mechanism from said spring.

25. In a typewriting machine, the combination with type keys and a universal bar frame operated thereby, of a ribbon vibrator,

an actuator pivoted on said frame and loosely connected to said vibrator to permit movement of the universal bar frame without actuating the vibrator, a lock or latch mounted upon the universal bar frame to engage said arm and cause it to reciprocate said vibrator at the movements of the universal bar frame, said lock also pivoted upon the universal bar frame, a link extending from said lock to an arm upon a rock-shaft, a second arm upon said rock-shaft, and a link extending from the second arm to the keyboard of the machine and having a finger-piece.

26. In a typewriting machine, the combination with type keys and a universal bar frame operated thereby, of a ribbon vibrator, an actuator pivoted on said frame and loosely connected to said vibrator to permit movement of the universal bar frame without actuating the vibrator, a lock or latch mounted upon the universal bar frame to engage said arm and cause it to reciprocate said vibrator at the movements of the universal bar frame, said lock also pivoted upon the universal bar frame, a link extending from said lock to an arm upon a rock-shaft, a second arm upon said rock-shaft, a link extending from the second arm to the keyboard of the machine and having a finger-piece, a ribbon-winding mechanism connected to a spring which propels the carriage, and means operated by said rock-shaft to disconnect said ribbon-winding mechanism from said spring.

27. In a typewriting machine, the combination with type keys and a universal bar frame operated thereby, of a ribbon vibrator, an actuator pivoted on said frame and loosely connected to said vibrator to permit movement of the universal bar frame without actuating the vibrator, a lock or latch mounted upon the universal bar frame to engage said arm and cause it to reciprocate said vibrator at the movements of the universal bar frame, said lock also pivoted upon the universal bar frame, a link extending from said lock to an arm upon a rock-shaft, a second arm upon said rock-shaft, a link extending from the second arm to the keyboard of the machine and having a finger-piece, a ribbon-winding mechanism connected to a spring which propels the carriage, and means operated by said rock-shaft to disconnect said ribbon-winding mechanism from said spring, said carriage provided with an escapement mechanism including a rack, means to move the rack to release the carriage from the escapement mechanism, and a connection from said rack to said rock-shaft.

28. In a typewriting machine, the combination with a carriage, a carriage-escapement mechanism, and a spring to propel the carriage, of a ribbon-winding mechanism



operable by said spring, a ribbon-vibrating mechanism operable by a set of type keys, and a key connected to means to silence the ribbon vibrator and the ribbon-winding means, devices to release the carriage from the control of the escapement mechanism, and means connected to the carriage-releasing device to silence the ribbon-winding means.

29. In a typewriting machine, the combination with ribbon-vibrating means operated at the key strokes and devices to silence said vibrating means, of a carriage, an escapement mechanism therefor, carriage-releasing devices, a spring to propel the carriage, a ribbon-feeding mechanism driven by said spring, a key connected to devices to silence the ribbon feeding mechanism, and connections ramifying from said feed-silencing means to said vibrator-silencing means and said carriage-releasing devices, whereby the ribbon-feeding mechanism is silenced automatically at the release of the carriage, and may also be silenced at will, together with the vibrating means, by operating said key.

30. In a typewriting machine, the combination with a carriage, escapement mechanism therefor, a key to release the carriage and a spring to propel the carriage, of ribbon-winding devices operated by said spring, a ribbon vibrator operating at the key strokes, a second key, said second key mounted on the framework of the machine, means operable by either of said keys, to silence said ribbon-winding devices, means operable by the second key to silence the ribbon-vibrator, and means to detain the ribbon-winding devices and the ribbon-vibrator in silenced condition.

31. The combination with a ribbon spool, of a driving shaft for the spool, said shaft shiftable endwise to become connected to the spool, a worm upon said shaft, a tumbler, a spring to move said tumbler into engagement with the worm, a ribbon released latch normally restraining said tumbler, a second latch to detain the tumbler in engagement with the worm, and means upon the shaft called into action at the endwise movement thereof for releasing the second latch and forcing said tumbler away from said worm.

32. The combination with a ribbon spool, of a driving shaft for the spool, said shaft shiftable to become connected to the spool, two normally disengaged shaft-controlling members, one upon the shaft and one upon the framework of the machine, means to effect engagement of said shaft-controlling members, a latch to maintain such engagement during the shifting of the shaft, and means to release said latch and separate said shaft-controlling members.

33. The combination with a ribbon spool,

of a driving shaft for the spool, said shaft shiftable to become connected to the spool, two normally disengaged shaft-controlling members, a normally restrained spring tending to effect engagement of said shaft-controlling members, ribbon-controlled means for releasing said spring, a latch to maintain engagement of the shaft-controlling members during the shifting of the shaft, and means to release said latch and separate said shaft-controlling members.

34. The combination with a ribbon spool, of a spool-driving shaft having a worm, a tumbler normally disconnected from said worm, a spring tending to engage the tumbler and the worm, said spring normally under restraint, ribbon-controlled means to release the spring, means operated by said tumbler and worm to effect reversal of the feed of the ribbon, and a latch to maintain engagement of the tumbler and worm.

35. The combination with a ribbon spool, of a spool-driving shaft having a worm, a tumbler, means tending constantly to effect engagement between the tumbler and the worm, means normally preventing such engagement, means controlled by the ribbon to permit such engagement, means operated by said tumbler and worm to effect reversal of the feed of the ribbon, and a latch to maintain engagement of the tumbler and worm.

36. The combination with a ribbon spool, of a spool-driving shaft, two coöperative devices to effect the reversal of the ribbon feed, one of said devices upon the shaft and the other upon the framework, means normally tending to effect engagement of said coöperative members, a ribbon-released latch to restrain such engagement, and means upon said shaft to effect separation of said coöperative devices to an extent to enable said latch to become effective.

37. The combination with a ribbon spool, of a spool-driving shaft, two coöperative devices to effect the reversal of the ribbon feed, one of said devices upon the shaft and the other upon the framework, means normally tending to effect engagement of said coöperative members, a latch normally restraining such engagement, ribbon-controlled means to release said latch, a second latch to hold said coöperative devices together during the feed-reversing operation, and means upon said shaft to release the second latch and effect separation of said coöperative devices to an extent to enable the first latch to become effective.

38. The combination of a ribbon-spool driving-shaft, a worm upon said shaft, a tumbler normally tending to engage said worm, a latch to restrain said tumbler, ribbon-controlled means to release said latch, said worm and tumbler coöperative to effect reversal of the ribbon feed, a second latch maintaining engagement of the worm and



tumbler, and a cam fixed to said worm to engage and lift the second latch at the completion of the feed-reversing operation, and then to engage said tumbler to restore it to the control of the first latch.

39. The combination with a ribbon spool, of a spool-driving shaft having a worm, a tumbler, means tending constantly to effect engagement between the tumbler and the worm, means normally preventing such engagement, means controlled by the ribbon to permit such engagement, means operated by said tumbler and worm to effect reversal of the feed of the ribbon, a latch to maintain engagement of the tumbler and worm, and means to release said latch.

40. The combination with a ribbon-spool, of a spool-driving shaft, a worm rotating therewith, a tumbler, ribbon-controlled means to cause the worm and tumbler to cooperate, means operated by said tumbler and worm to effect reversal of the feed of the ribbon, and a latch to maintain engagement of the tumbler and worm.

41. The combination with a ribbon-spool, of a spool-driving shaft, a worm rotating therewith, a tumbler, ribbon-controlled means to cause the worm and tumbler to cooperate, means operated by said tumbler and worm to effect reversal of the feed of the ribbon, a latch to maintain engagement of the tumbler and worm, and means to release said latch.

42. The combination of a ribbon-spool driving-shaft, a worm connected to said shaft, a tumbler normally tending to engage said worm, a latch to restrain said tumbler, ribbon-controlled means to release said latch, said worm and tumbler cooperative to effect reversal of the ribbon feed, and a cam connected with said worm to engage said tumbler to restore it to the control of the first latch.

43. In a typewriting machine, the combination with a ribbon-spool shaft having a gear, of a driving-shaft shiftable endwise and having a gear to shift into and out of mesh with said gear, a worm upon said driving-shaft, a rock-shaft alongside of the spool-shaft and carrying a tumbler, a spring tending to swing said tumbler into mesh with said worm, a latch to prevent said rock shaft and tumbler from being swung by said spring, and ribbon-controlled means to release said latch.

44. In a typewriting machine, the combination with a ribbon spool shaft having a gear, of a driving-shaft shiftable endwise and having a gear to shift into and out of mesh with said gear, a worm upon said driving-shaft, a rock-shaft alongside of the spool-shaft and carrying a tumbler, a spring tending to swing said tumbler into mesh with said worm, a latch to prevent said rock shaft and tumbler from being swung by said

spring, a follower provided upon the coils of ribbon, and having means to release the latch when the spool is empty.

45. In a typewriting machine, the combination with a ribbon spool shaft having a gear, of a driving-shaft shiftable endwise and having a gear to shift into and out of mesh with said gear, a worm upon said driving-shaft, a rock-shaft alongside of the spool-shaft and carrying a tumbler, a spring tending to swing said tumbler into mesh with said worm, a latch to prevent said rock shaft and tumbler from being swung by said spring, ribbon-controlled means to release said latch, a second latch pivoted upon said tumbler to engage a fixture, and maintain the tumbler in mesh with the worm, and means to release said second latch at the completion of the endwise shifting movement of the shaft.

46. In a typewriting machine, the combination of a ribbon-spool and driving means therefor, of a follower mounted to rotate with the spool and to rest upon the edges of the coils of ribbon, a stationary cam in the path of a part of said follower to separate the follower from said edges intermittently, and ribbon-feed reversing devices called into action by said follower when the coils of ribbon against which it bears are paid off from the spool.

47. In a typewriting machine, the combination with a shaft and means to drive the same, of a follower mounted upon said shaft, a ribbon spool also mounted upon said shaft and detachable from the shaft and follower, the latter constructed to bear against the edges of the coils of ribbon on the spool, and ribbon-feed reversing devices called into action by said follower when the coils of ribbon against which it bears are paid off from the spool.

48. In a typewriting machine, the combination of a ribbon spool, means to rotate the same, a follower mounted to rotate with the spool and bear against the edges of the coils of ribbon, means dependent upon the rotation of the spool to separate the follower intermittently from the coils of ribbon, and ribbon-feed reversing devices called into action by said follower when the coils of ribbon against which it bears are paid off from the spool.

49. In a typewriting machine, the combination of a ribbon spool, means to rotate the same, a follower mounted to rotate with the spool and bear against the edges of the coils of ribbon, and ribbon-feed reversing devices called into action by said follower when the coils of ribbon against which it bears are paid off from the spool.

50. In a typewriting machine, the combination of a ribbon spool, means to rotate the same, a follower mounted to rotate with the spool and bear against the edges of the



coils of ribbon, said follower tending to enter the spool, a lever to intercept said follower when the latter enters the spool, a latch released by said lever, and coöperative ribbon-feed reversing devices normally restrained from coöperation by means of said latch.

51. In a typewriting machine, the combination with a shaft and means to drive the same, of a follower mounted upon said shaft, a ribbon spool also mounted upon said shaft and detachable from the shaft and follower, the latter constructed to bear against the edges of the coils of ribbon on the spool, a latch releasable by said follower when the coils of ribbon against which the follower bears are paid off from the spool, and ribbon-feed reversing devices tending normally to coöperate, and normally retained by said latch.

52. In a typewriting machine, the combination of a ribbon-spool and driving means therefor, of a follower mounted to rotate with the spool and to rest upon the edges of the coils of ribbon, a stationary cam in the path of a part of said follower to separate the follower from said edges intermittently, and ribbon-feed reversing devices called into action by said follower when the coils of ribbon against which it bears are paid off from the spool, said spool detachable from said driving means and said follower.

53. The combination with a spool and a ribbon-winding mechanism, of a follower to ride upon the edges of the coils of ribbon and mounted to rotate with the spool, an interponent in the path of said follower to be moved thereby when the spool is empty, a latch releasable by said interponent, a rock-shaft having an arm carrying said latch, a spring to turn said arm when the latch is released by said interponent, a tumbler carried by said rock-shaft, and a main driving-shaft endwise shiftable and having a worm engageable by said tumbler when the rock-shaft is turned by said spring.

54. The combination with a spool and a ribbon-winding mechanism, of a follower to ride upon the edges of the coils of ribbon and mounted to rotate with the spool, an interponent in the path of said follower to be moved thereby when the spool is empty, a latch releasable by said interponent, a rock-shaft having an arm carrying said latch, a spring to turn said arm when the latch is released by said interponent, a tumbler car-

ried by said rock-shaft, a main driving-shaft endwise shiftable and having a worm engageable by said tumbler when the rock-shaft is turned by said spring, a second latch to maintain engagement of said worm and finger to cause the driving shaft to shift endwise, and a cam upon the driving shaft to release the second latch and turn said rock-shaft back to normal position to be re-detained by the first latch.

55. The combination with a spool and a ribbon-winding mechanism, of a follower to ride upon the edges of the coils of ribbon and mounted to rotate with the spool, an interponent in the path of said follower to be moved thereby when the spool is empty, a latch releasable by said interponent, a rock-shaft having an arm carrying said latch, a spring to turn said arm when the latch is released by said interponent, a tumbler carried by said rock-shaft, and a main driving-shaft endwise shiftable and having a worm engageable by said tumbler when the rock-shaft is turned by said spring; a stationary cam being provided in the path of said follower, to withdraw the same from the spool at each revolution.

56. In a typewriting machine, the combination with a winding shaft, of a spool detachably mounted thereon and constructed so that it may be mounted either side up upon said shaft, a follower mounted outside of the spool to rotate with the shaft and to bear against the edges of the ribbon coils, the flanges of the spool having openings through which said follower may pass, and ribbon-reversing devices actuable by said follower when the coils are paid off from the spool.

57. In a typewriting machine, the combination with a winding shaft, of a spool detachably mounted thereon and constructed so that it may be mounted either side up upon said shaft, a follower mounted outside of the spool to rotate with the shaft and to bear against the edges of the ribbon coils, the flanges of the spool having openings through which said follower may pass, and ribbon-reversing devices actuable by said follower when the coils are paid off from the spool; means being provided to withdraw the follower from the coils repeatedly during the winding and unwinding of the ribbon from the spool.

WALTER E. BARNARD.

Witnesses:

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