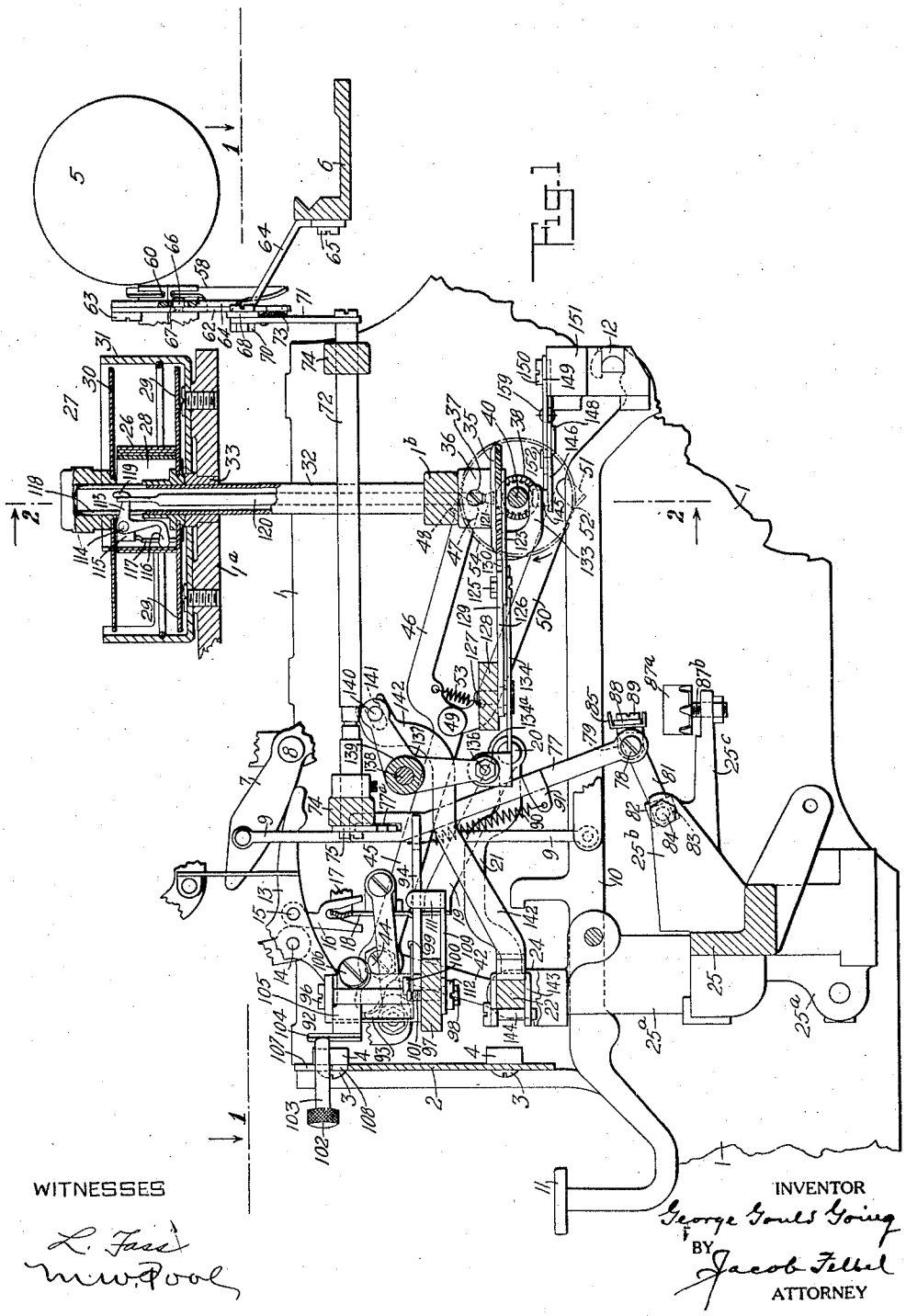
April 10, 1928. 1,665,736

G. G. GOING

TYPEWRITING MACHINE

Filed Sept. 30, 1925 3 Sheets-Sheet 1



WITNESSES

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TYPEWRITING MACHINE

Filed Sept. 30, 1925 3 Sheets-Sheet 2

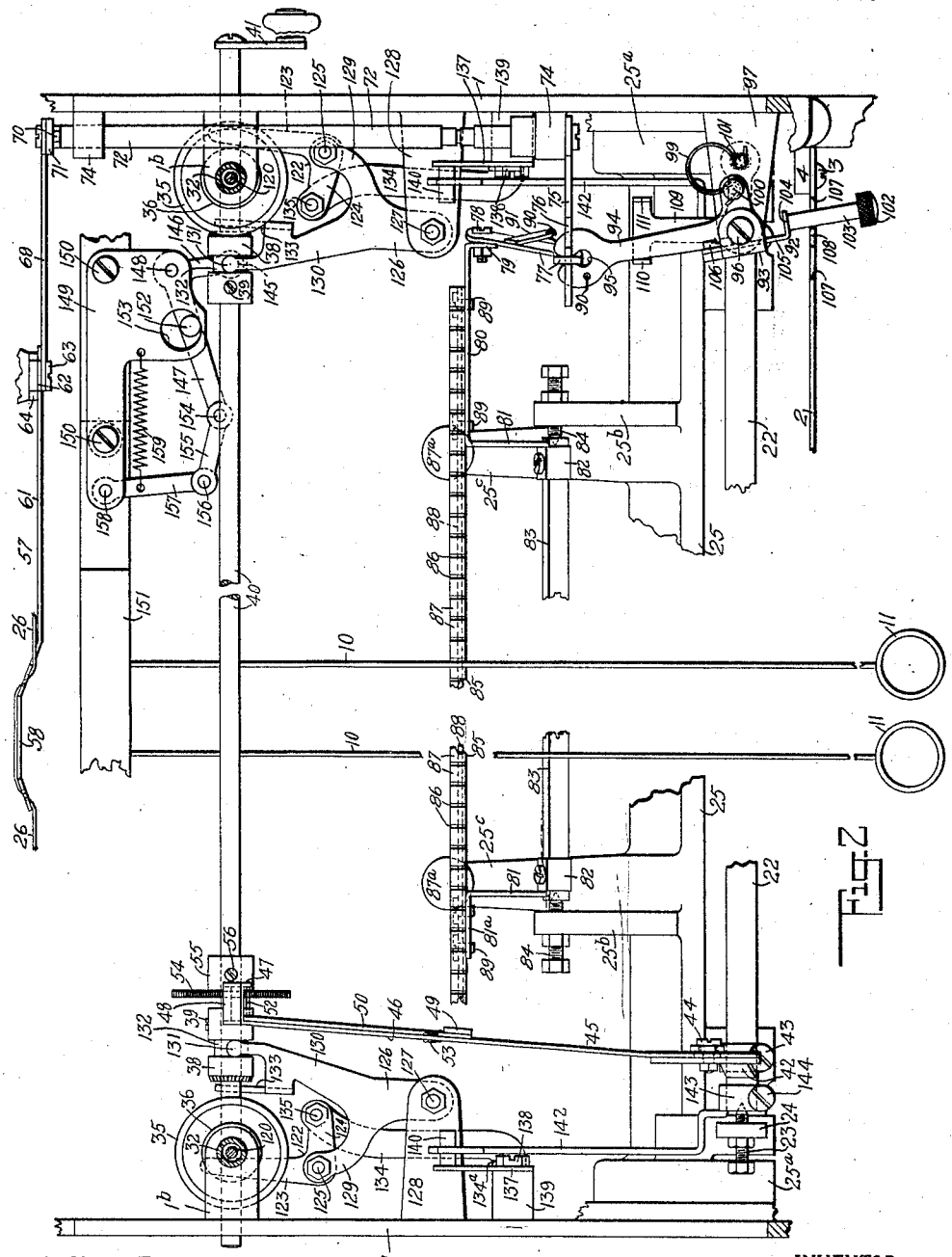


Fig. 2

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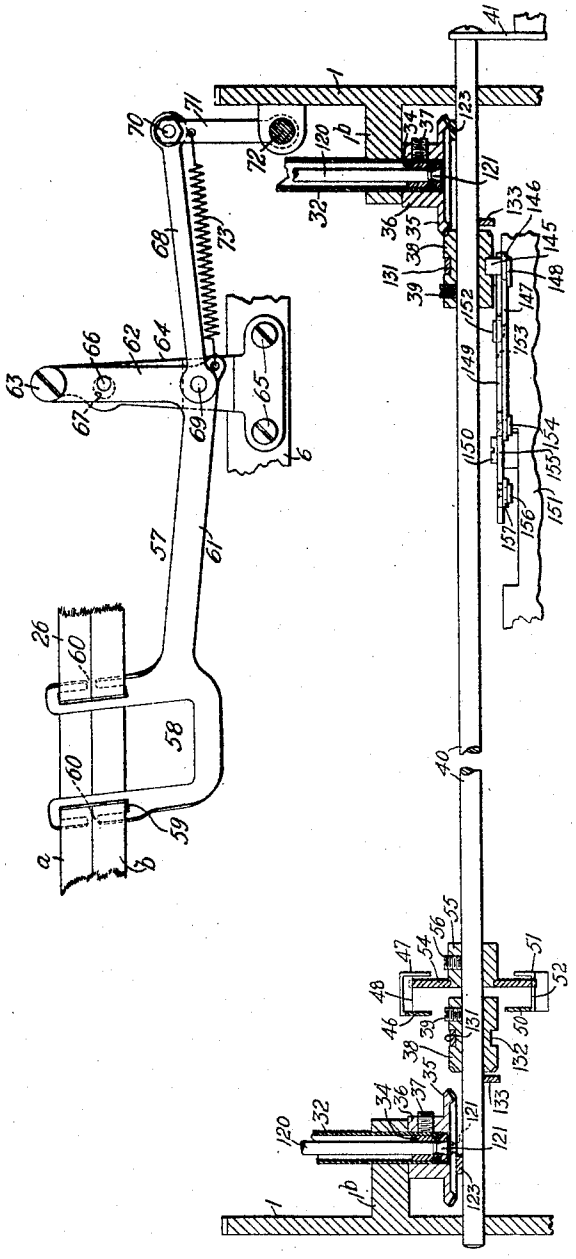
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G. G. GOING

TYPEWRITING MACHINE

Filed Sept. 30, 1925 3 Sheets-Sheet 3



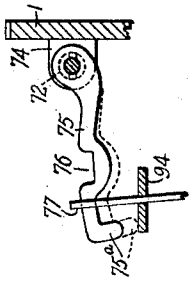


Fig. 4

Fig. 3

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UNITED STATES PATENT OFFICE.

GEORGE G. GOING, OF MIDDLETOWN, CONNECTICUT, ASSIGNOR, BY MESNE ASSIGNMENTS, TO REMINGTON TYPEWRITER COMPANY, A CORPORATION OF NEW YORK.

TYPEWRITING MACHINE.

Application filed September 30, 1925. Serial No. 59,623.

My invention relates to ribbon mechanisms for typewriting machines and its general object is to provide a complete ribbon mechanism for such machines, said mechanism being capable of performing all of the usual functions characteristic of such mechanism. Stated more specifically the objects of my invention are to provide new and improved feeding mechanism, vibrating mechanism, field-changing mechanism, and reversing mechanism for the ribbon.

To the above and other ends which will hereinafter appear, my invention consists in the features of construction, combinations of devices and arrangements of parts hereinafter described and particularly pointed out in the claims.

As illustrated in the accompanying drawings, the preferred form of my invention is shown as applied to a No. 6 Remington-Noiseless typewriting machine, although it is to be understood that the various features of the invention are readily applicable in whole or in part to other styles of writing machines.

In the drawings,

Fig. 1 is a fragmentary front-to-rear vertical sectional view taken about centrally of the machine, only so much thereof being shown as is necessary to a full understanding of the invention.

Fig. 2 is a fragmentary horizontal sectional view taken on a plane indicated by the section line 1—1 in Fig. 1 and looking downward in the direction of the arrows at said line.

Fig. 3 is a fragmentary vertical sectional view taken on a plane indicated by the section line 2—2 in Fig. 1 and looking rearward in the direction of the arrows at said line.

Fig. 4 is a front elevation of a detail of construction.

As appears from the drawings, the main frame of the machine comprises side plates 1 which are connected at the front by a cross piece, not herein shown, but which is formed integrally with the side plates. Said plates 1 are also connected by a rear plate and surmounted by a top plate 1^a only fragmentarily illustrated. The upper parts of the side plates 1 are connected at the front by a cross plate 2 which is secured by screws 3 to lugs 4 projecting inward from the side plates. The platen 5, diagrammatically illustrated in Fig. 1, is mounted on a carriage (not shown) which is adapted to travel back and forth on a grooved track-way or trough, part of which is shown and numbered 6. Cooperative with the front face of the platen are a set of type bars, not herein shown, each type bar being operative by a train of connections comprising a sub-lever 7 having a stationary pivot 8 and connected by a link 9 with a key lever 10 provided at its front end with a key-cap or key 11 and pivotally supported at 12 towards the rear of the machine. Each sub-lever 7 has a rolling connection with a driving lever 13 which has a stationary pivot 14. Suspended from the driving lever at 15 is a link 16 the lower end portion whereof is bifurcated or forked to embrace or straddle a horizontally disposed arcuate universal bar 17 which is part of a frame 18 having extensions such as 19. The extensions are pivotally connected at 20 with arms 21 fixed to and extending rearward from a square rock shaft 22 that is pivoted on pivot pins 23 adjustably secured in ears 24 projecting from the side portions 25^a of a yoke or cross bar 25 that extends from side to side of the machine and is secured to the side plates 1. The rock shaft 22 has operative connections to the escapement mechanism of the machine not herein shown. The parts hereinbefore referred to are common to the No. 6 Remington-Noiseless typewriting machine and need not be described at greater length.

The ribbon 26 as herein shown is divided into longitudinal stripes, zones or fields, designated as *a* and *b*, and having different colors or characteristics. The ribbon is wound on rotary carriers or spools arranged at opposite sides of the machine above the top plate. Each carrier, designated as a whole by the number 27, comprises a hub or core portion 28 and flanges 29 and 30, the top flanges or heads being detachable, the spools being arranged in housings or casings 31 detachably secured to the top plate 1^a. The spools are mounted at the upper end portions of vertically arranged shafts 32 which bear near their upper ends in bushings 33 in the top plate, the lower end portions of said shafts bearing in lugs 1^b projecting inward from the side plates 1. The shafts 32 are hollow and each carries in its lower end a block or plug 34, and arranged outside of the shaft below the lug 1^b is a beveled wheel 35 having a hub portion 36

which receives a set screw 37, whereby the beveled wheel is secured to the shaft. Adapted to mesh alternatively with the beveled wheels 35 are beveled pinions 38 secured by set screws 39 to a horizontally arranged driving shaft 40 that extends from side to side of the machine and bears rotatably and slidably in the side plates 1, the right-hand end portion of said shaft projecting outside the side frame and having secured to it a handle 41 for manually turning and shifting the driving shaft.

For automatically turning the shaft 40, connections are provided to the rock shaft 22, said connections comprising a crank arm 42 having a jaw-like or U-shaped lower end portion which embraces the rock shaft 22 and is clamped or secured thereto by a clamping screw 43 that connects the free end portions of the U-shaped end. The crank arm 42 projects upward from the rock shaft and inclines slightly rearward, its upper end portion being connected pivotally at 44 with a rearwardly and downwardly extending pawl-carrying member 45 that is off-set upwardly to provide an arm 46 which terminates in a U-shaped laterally extending portion 47, the cross portion of which is beveled at 48. There is thus provided a U-shaped pawl 47—48 at the end of the arm 46. Pivotally connected to the member 45 at 49 is a rearwardly extending arm 50 parallel to the arm 46 and which also terminates in a U-shaped laterally extending portion 51, the cross portion of which is beveled or shaped as indicated at 52 to provide a pawl tooth. It will be observed that the edges or teeth 48 and 52 are oppositely disposed, the former being at the rear side, and the latter at the front side of their respective cross portions or pawls. The parallel arms 46 and 50 are connected by a draw spring 53 which tends constantly to draw the pawl arms towards each other and to maintain the pawl teeth 48 and 52 in operative engagement with a ratchet wheel 54 having a hub portion 55 which receives a set screw 56 whereby the ratchet wheel is secured to the ribbon driving shaft 40 just to the right of the left-hand driving pinion 38. The U-shaped pawls loosely embrace the ratchet wheel 54. The construction is such that at each operation of a printing key lever 10 the link 9 actuating the sub-lever 7 and the driving lever 13 will cause the latter, through the forked link 16, to depress the universal bar 17, causing the arms 19 that are part of the universal bar frame to act on the crank arm 21 and rock shaft 22. The motion of the rock shaft will be transmitted through the crank arm 42 to the connected pawl carrier or member 45 which will be moved rearward causing the pawl arms 46 and 50 to move rearward and downward. During this movement the pawl tooth 48, co-acting with the teeth of the ratchet wheel 54 at the upper side thereof, will turn the wheel in the direction of the arrow in Fig. 1. At the same time the pawl tooth 52 will slide or click idly over the ratchet teeth at the under side of the wheel 54, the pawl teeth being held by the spring 53 in contactive engagement with the ratchet wheel. When the actuated printing key lever is released the parts will be restored to normal position by the several restoring springs, the pawl arms 46 and 50 being retracted as the shaft 22 is rocked forward. During the retracting movement the pawl tooth 52 will co-act with the ratchet wheel to turn it in the direction of the arrow in Fig. 1, while the pawl tooth 48 will click idly over the wheel. In other words, by means of the double-pawl construction the ratchet wheel 54 is turned both during the actuation of the printing keys 11 and also during their return movements. The turning movement of the ratchet wheel 54 is of course communicated to the ribbon driving shaft 40, and the driving pinions 38. As will be apparent from Fig. 3, these pinions are so located on the driving shaft relatively to the beveled wheels 35 that only one pinion 38 and its associate wheel 35 can be in mesh at the same time, the other pinion and wheel being then disengaged. As a consequence the turning movement of the engaged or intermeshing pinion 38 and wheel 35 will be transmitted to the connected spool shaft 32, causing it to turn its spool 27 and wind the ribbon thereon, the ribbon at the same time being drawn off or unwound from the companion ribbon spool at the opposite side of the machine.

The ribbon 26 is led from the spools 27 through slots in the casings 31, and midway between the spools the ribbon is threaded or passed through a vibratory holder or vibrator 57. The ribbon vibrator or carrier 57 is made preferably of sheet metal and comprises a U-shaped body portion 58 having its sides bent forward and with slots indicated at 59, the slots being formed with outlets or mouths 60 through which the ribbon may be introduced or threaded and withdrawn. Rightward from the body portion 58 extends an integral arm 61 terminating in an upright extension 62 which is pivoted at 63 on a bracket or arm 64, the lower end of which is secured by screws 65 to the front vertical face of the trackway part 6, the arm 64 being off-set rearward so that its lower end is in the plane of the trackway. The vibrator is thus pivoted in front of the platen at one side of the printing point and slightly above the top edge of the ribbon. The extreme movements of the vibrator 57 on its pivotal center 63 are limited by a pin 66 which plays in a hole, indicated at 67, in the bracket or arm 64. Vibratory movements of the vibrator 57, whereby it is moved sub-

stantially transversely of the printing line, are communicated by a train of connections which is actuated at each stroke of the printing keys. Said train comprises a link 68 pivoted at 69 to the vibrator and thence extending rightward, the right-hand portion of the link being pivotally connected at 70 to the upper end of a crank arm 71 that is fixed at its lower end to the rear end portion of a horizontal rock shaft 72. A drawspring 73 connects the crank arm 71 with the vibrator 57 at the elbow formed by the junction of the arms or portions 61 and 62. The rock shaft 72 which extends towards the front of the machine takes bearings in lugs 74 projecting inward from the right-hand side plate 1. At its forward end said rock shaft carries a horizontal leftwardly extending crank arm 75 which is formed between its ends with a depression 76. Adapted variably to engage with the crank arm 75 is a link or connector 77, the upper end of which is slotted as indicated at 77^a to engage slidably with the crank arm 75. The lower end of the link is pivoted at 78 to an ear or extension 79 which is part of an angular supporting member 80 having at its left-hand end a forward extension 81 that terminates in a jaw or U-shaped portion 82 that fits over a square rock shaft 83 and is screwed thereto, said rock shaft bearing on pivot screws 84 adjustably secured to ears 25^b integral with the cross bar 25. A second angular arm comprising a U-shaped portion or jaw 82 embracing the shaft 83 and screwed thereto is arranged at the left-hand end portion of said shaft 83, said angular arm further comprising a rearward portion 81 and an angular extension 81^a. The two angular arms 81 provide support for a straight universal bar that is arranged under the set of key levers 10 in a position to be actuated by them when they are depressed. Said universal bar 85 is U-shaped in cross section, being formed preferably of sheet metal, and its upper flange is formed with slits 86 at short intervals, these separating or dividing the flange into a series of tongues 87 or individual contacts. The tongues are sufficiently flexible to yield when engaged by the key levers 10. Arranged inside the universal bar is a strengthening strip 88 of suitable material. The universal bar is secured by screws 89 to the supporting arms 81, the screws 89 likewise serving to hold the strengthening strip in place. When a key lever is depressed it will act on the universal bar 85 causing it to swing about the axis of the shaft 83, this motion being transmitted through the link 77 to the crank arm 75, rocking the shaft 72 and swinging leftward the crank arm 71. This motion of the crank arm transmits a thrust to the link 68 which swings the vibrator 57 upward across the printing line, interposing the printing portion of the ribbon in the path of the oncoming type bar, as is well understood. When the actuated key is released the parts will be restored to normal position, the vibrating train being restored by the spring 73 and by an additional restoring spring 90 which is connected at its lower end to a projection 91 on the link 77 and at its upper end to a switch hereinafter described. The universal bar 85—87 in association with the strip 88 is found to minimize the noise due to the striking of the key levers against it so that sound is substantially eliminated. Preferably stops are provided for limiting downward movement of the universal bar 85—87, such stops being in the form of pads 87^a of fiber or the like, mounted on adjustable holders 87^b that are supported on projections 25^c from the cross bar 25.

Means are provided for at will changing the throw or extent of vibratory movement of the ribbon holder or vibrator 57 in order that either of the fields or zones *a* and *b* may be employed at pleasure. Said field-changing means in the present instance comprises a hand actuated switch for switching and setting the link 77 in varying predetermined relationships with the crank arm 75. Said switch, designated as a whole by the reference numeral 92, is preferably made of a single piece of sheet metal cut and shaped to provide a U-shaped body portion 93 and a rearwardly extending arm 94. Said arm 94 is enlarged at its rear end and formed with an open-mouthed slot 95 which loosely embraces the upper end portion of the link 77 below the crank arm 75. The upper end of the spring 90 is anchored to the enlarged end portion of the arm 94. The parallel horizontal sides of the body portion 93 are perforated to receive a pivot member which is in the form of a vertical screw 96 having an elongated shank, the lower end of the screw being threaded into a horizontally disposed lug 97 projecting inward from the right-hand side plate 1. The U-shaped body portion 93 rests on and is supported by the lug 97 and is adapted to turn on the screw 96 as a pivot, the top and bottom sides of the body portion 93 being confined between the head of the screw 96 and the upper face of the lug or projection 97. The pivot screw 96 is held rigidly on the lug 97 by a clamping nut 98 which is threaded on the lower end of the screw 96 projecting below the under face of the lug 97. Spring pressure is applied to the switch 92 by a U-shaped spring 99 which is hooked around a pin 100 on the switch, the opposite end of said spring being hooked over or anchored to a pin 101 on the lug 97. For controlling the switch 92 there is provided a key or finger piece in the form of the knurled head 102 of a shank 103 secured to the angularly offset portion 104 of an arm 105 which is

pivoted on a screw 106 at the rear of the body portion 93, so as to enable the handle or finger piece 102 to be moved up and down about the screw pivot 106 independently of the switch while at the same time participating in lateral swinging movements of the switch about the pivotal center 96. The shank 103 projects forward through an opening 107 in the front plate 2, the lower side of said opening being formed about at its middle with a depression or notch 108. Adjacent the opening 107 the front plate may be provided with the usual color indicia with which the shank and head 102 cooperate as a pointer. When the shank 103 is in register with the notch 108 it may be pushed downward so as to seat in said notch, thereby locking the switch against lateral movement. The parts are so constructed and proportioned that at such time the link 77 is in register with the depression 76 in the arm 75, the consequence being that when the link is pulled down at actuations of the keys 11 the link will play idly in the depression 76 and will not affect the crank arm 75. In other words, the ribbon vibrating mechanism will be rendered ineffective, as is desired when mimeographing is being done. On raising the shank 103 out of the notch 108 the switch 92 may be swung on the center 96 either to the left or right, that is, further from or closer to the pivotal axis 72 of the arm 75. When the switch is in the Fig. 2 position the link 77, acting on the arm 75, will lift the vibrator to its lesser extent, raising the upper field *a* to the types at printing operation. By switching the member 92 towards the right the link 77 may be slid rightward along arm 75 and reset close to the pivotal axis thereof, so that at printing operations a greater throw will be given to the vibrator, sufficient to present the lower field *b* to the types. In order to limit the sidewise or switching movements of the switch 92, a stop plate 109 is provided, said plate being horizontally disposed and having at its rear end upright projections or stops 110 and 111 for cooperation with the sides of the arm 94. The stop plate 109 is secured to the underside of the lug 97 by a headed screw 112. The stop 110 limits the movement of the switch 92 towards the left, while the stop 111 limits such movements towards the right. It will be understood that the notch or slot 95 in the switch 92 by loosely embracing the sides of the link 77 will maintain the link at varying predetermined points lengthwise of the crank or operating arm 75 without, however, interfering with actuating movements of said link which will slide or move up and down through the notch 95 during printing operations.

Means are provided for reversing automatically the direction of the ribbon feed, so that when the ribbon is fully wound on one spool, leaving the other spool bare, it may be fed back again until completely rewound on the bare spool. The ribbon reversing means are preferably controlled by the inner plies of the ribbon on the spools and comprises bell cranks 113, one for each ribbon spool. Said bell cranks are pivoted at 114 on ears 115 bent inward from the spool cores 28. The depending arm of each bell crank 113 terminates in a nose 116 which projects outward through a vertical slot-way 117 in the spool core. The horizontally disposed arm of each bell crank 113 projects inward through a kerf or slot-way 118 in the associate shaft 32, and terminates in a hook-like portion 119 from which is suspended a rod 120 that extends downward through the bore of the shaft 32 and normally terminates just within the lower end of the said shaft, as shown by full lines in Fig. 3. Preferably the end portion of each rod 120 is formed with a circular groove 121 to insure proper cooperation with an abutment, later described. It will be understood that each rod 120 is held within the shaft 32 by the associate bell crank 113, and that the bell crank is maintained in a position effective to accomplish this result by the inner plies of the ribbon 26 which are wound on the spool core and cover the slot 117, preventing the nose 116 from being pushed out through the slot by the weight of the rod 120. It will be further understood that when the ribbon has been completely unwound from one of the spools, uncovering the slot 117, the nose 116 will be freed, permitting the rod 120 to drop down through the force of gravity until its notched lower end is exposed below the lower end of the shaft 32. This results in setting in operation a train of reversing mechanism which theretofore has moved idly at each actuation of the printing keys. There are two of such trains of mechanism, one associated with each ribbon spool and comprising an angular member or bell crank 122 having a rearwardly extending arm 123 which is adapted to vibrate in a horizontal plane just under the lower end of the associate shaft 32, said angular member further comprising an inwardly extending arm 124. Each member or bell crank 122 is pivoted at 125 to the under side of a bifurcated supporting member 126 which in turn is pivoted at 127 to the under side of a lug or projection 128 extending inward from the adjacent side plate 1. The bell crank 122 is pivoted to the shorter arm or bifurcation 129 of the member 126, the longer arm 130 of said member extending rearward and inward and terminating in a rounded portion 131 which fits in a circumferential groove 132 formed in the body portion of the associate driving pinion 38, thus connecting the member 126

with the ribbon driving shaft 40 so that pivotal movements of the member will be transmitted to the shaft, moving it endwise. At the same time the connection is such that rotary movements of the shaft will not be interfered with, the grooved portions 132 of the driving pinions turning freely over the rounded portions 131 of the members 126. Each arm 130 is preferably provided with a downwardly bent and rearwardly extending finger 133 which underlies the shaft 40 and prevents displacement of the member 126 in an upward direction, such as would disconnect the rounded end 131 from the groove 132. The angular members or bell cranks 122 are connected by trains of devices with the rock shaft 22 so as to receive impulses whenever the printing key levers are depressed. Each train of devices comprises a link 134 pivoted to the arm 124 at 135, said link extending forward and terminating in an upwardly bent ear 134ª which is pivotally connected at 136 with the depending arm of a bell crank 137 pivoted on a pivot screw 138 which is secured in a boss 139 on the adjacent side plate on frame member 1. The other arm of the bell crank 137 carries a pin 140 which engages loosely in a slot 141 formed at the rear end of an arm 142 which extends downward and forward, terminating in a U-shaped or jaw-like portion 143 which fits over or embraces the rock shaft 22 and is clamped thereto by a clamping screw 144. When, as explained, the shaft 22 is rocked rearward on depressions of the printing key levers 10, the arms 142 will be swung downward, turning the connected bell cranks 137 and causing them to pull forward the links 134, these in turn actuating the angular members 122 and swinging their arms 123 inward past the lower ends of the shafts 32 and the rods 120 housed therein. When the keys are released the parts are returned to normal position, the arms 123 swinging back under the shafts 32. It will be understood that during these vibratory movements of the members 122 on their pivotal centers 125 the members 130 will not be affected, so that pivotal centers 125 will remain stationary, as will of course the rounded engaging portions 131. When, however, the ribbon is completely unwound from one of the spools, allowing the associate rod 120 to drop down to the dotted line position shown at the left in Fig. 3, the grooved portions 121 of the rod will obstruct the path of the arm 123 acting as an abutment or obstruction to prevent or block further pivotal movement of the bell crank 122 around the center 125 after the arm 123 has contacted with the rod. As a consequence further forward pull on the link 134 will be transmitted through the bell crank 122 to the member 126 which heretofore has remained quiescent, causing said member to swing leftward on its pivot 127. This operation will be clear from a consideration of Fig. 2 which shows the arm 123 of the left-hand bell crank 122 positioned as blocked by the drop rod 120. At this time the pull of the left-hand link 134 will be to the left side of the pivotal center 127, and since the bell crank 122 is prevented from turning freely on its axis 125 the main effect of the link will be on the member 126 which will be forced to yield, and as it turns will move the driving shaft 40 leftward in a longitudinal direction, causing the right-hand pinion 38 to separate from its gear wheel 35 and bringing the left-hand pinion 38 into contiguity to its gear wheel 35. The final stage of the left-hand shifting movement of the shaft 40 is assisted by certain spring actuated toggle devices as hereinafter described. The parts are so proportioned and arranged that always the bell crank 122 which is next to become effective has its arm 123 positioned for immediate contact with the associate rod 120 when it drops, so that the reversing operation is promptly begun and expeditiously accomplished. When the feed of the ribbon is reversed and it starts to rewind on the empty spool, the nose 116 of the bell crank 113 will be forced inward toward the spool axis, causing the bell crank to lift the drop rod 120 out of the path of the arm 123.

In order to assist the driving shaft 40 to complete fully its longitudinal shifting movement, detent or toggle devices are provided, preferably comprising a pin 145 carried by the free end of an arm 146 and projecting up into the right-hand groove 132. The arm 146 is part of a bell crank that further comprises an inwardly extending arm 147, the bell crank 146, 147 being pivoted at 148 to the under side of a plate 149 that is secured by screws 150 to a stationary cross bar 151. Movements of the bell crank are limited by a pin 152 carried by the arm 147 and adapted to play in a circular hole 153 in the plate 149. The inner end of the arm 147 is pivotally connected at 154 with a link 155 which is also pivotally connected at 156 with an arm 157 pivoted at 158 to the plate 149. A draw spring 159 connects the arm 157 with the plate 149 and constantly tends to pull said arm rightward about its pivot 158. The arm 147 and the link 155 constitute in effect a toggle, which when carried slightly past the straight line position in either direction is further broken by the action of the spring 159. That is, the action of each member 126 is sufficient to actuate the toggle from one of its broken positions (one of which is shown in Fig. 2), then to straighten it and carry it slightly past the straight-line position, whereupon the spring 159 becomes effective further to complete the toggle movement, and as a consequence, the

right line movement of the shaft 40 with which the toggle is connected by the pin 145 and groove 132.

In view of what has been said heretofore, it is not believed to be necessary to enter into a detailed explanation of the mode of operation of the entire mechanism, but one or two points may be adverted to. Referring to the construction of the universal bar 85—87, the slits 86 are continued through the full width of the upper flange and penetrate slightly down past the upper corner of the bar and into the front vertical portion thereof. The flexibility of the tongues or contacts is thereby promoted. Also to this end the U-shaped universal bar or channel bar is made of extremely thin sheet metal, the additional device or strip 88 being employed to stiffen or strengthen it. The upper tongued portions of the bar 85—87 are inclined slightly to the horizontal so that the key levers when depressed will first contact with the rear free ends of the tongues which are so flexible that they absorb the shock of contact of the key levers and as the key levers are further depressed will yield or give sufficiently to enable the bottom edges of the key levers to ride over the tops of the tongues and finally come to rest on the corner of the universal bar just at the upper bend. This results in an easy and quiet action of the key levers on the universal bar through the tongues due to their yielding or flexibility, whereby noise is substantially eliminated. Owing to the elasticity of the tongues, they return to normal position as the key lever ascends.

During ribbon vibrating operations, when the mechanism is set for printing from the lower field *b* of the ribbon 26, upward movements of the vibrator will be limited by contact of the pin 66 with the left hand side of the hole 67, the pin and the hole providing stop devices to prevent excess movement of the vibrator and so that the printing field will always be within the lower edge of the ribbon. Preferably stop devices are also provided for limiting the throw of the vibrator when the mechanism is set for printing in the upper field *a* of the ribbon 26. Said stop devices are illustrated in Fig. 4 and comprise the downwardly extending or nose portion 75ª of the crank arm 75. When the link 77 is set in the position furthest from the rock shaft 72 as shown in this figure the outer end portion of the arm 94 will be brought under the nose 75ª so that when the arm 75 is swung down during the vibrating operation the nose will be brought in contact with the arm 94, thereby arresting the downward swing of the arm 75, as shown by dotted lines in Fig. 4. The parts are so proportioned and related that the effect of this stoppage of the arm will be to prevent the vibrator from being swung upward sufficiently to carry the lower edge of the ribbon field *a* too far, thus preventing any tipping or printing of the lower portions of any of the letters from the lower ribbon field *b*.

It will be seen that by my invention there is provided a complete ribbon mechanism for a typewriting machine which performs the necessary functions of feeding, vibrating, and reversing the ribbon as well as changing ribbon fields or dispensing with the use of the ribbon, all of these functions being accomplished readily and effectively by means comparatively simple in construction and which can be economically manufactured.

Various constructional changes may be made without departing from my invention, and of course some of its features may be made use of without others in association with ribbon mechanism of other forms or styles.

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

1. In a typewriting machine, the combination of ribbon spools, a ribbon driving shaft therefor, a ratchet wheel operatively connected with said shaft, a pair of pawls constantly engaged with said ratchet wheel, printing key levers, type bar actuating devices connected with said levers, a universal bar operative by certain of said devices, a rock shaft connected with said universal bar, a crank arm on said rock shaft, and a pawl carrying member pivotally connected directly to said crank arm and carrying said pair of pawls.

2. In a typewriting machine, the combination of ribbon spools, a ribbon driving shaft therefor, a ratchet wheel connected with said shaft, a pair of feeding pawls constantly engaged with said ratchet wheel, printing key levers, type bar actuating devices connected with said levers, a universal bar operative by certain of said devices, and a rock shaft connected with said universal bar, said pair of pawls being actuated by said rock shaft.

3. In a typewriting machine, the combination of a ribbon vibrator, printing key levers, and connections between said printing key levers and said vibrator comprising a universal bar formed with a series of tongues engageable by said key levers and adapted to be flexed thereby, the tongues alone transmitting movement from said key levers to said universal bar.

4. In a typewriting machine, the combination of a ribbon vibrator, key levers, and connections between said key levers and said vibrator comprising a universal bar formed with a series of flexible contacts engageable by said key levers and provided with a strip of strengthening material, the tongues alone transmitting movement from said key levers to said universal bar.

5. In a typewriting machine, the combi-

nation of a ribbon vibrator, key levers, and connections between said key levers and said vibrator comprising a U-shaped universal bar having parallel flanges, one flange formed with individual flexible tongues, and a strip of strengthening material secured within said universal bar.

6. In a typewriting machine, the combination of a ribbon vibrator, a link connected thereto, a rock shaft operative on said link, a crank arm on said rock shaft, a key operated universal bar, and a link connected with said crank arm and with said universal bar, said universal bar being provided with individual contact tongues and with a strip of strengthening material.

7. In a typewriting machine, the combination of a ribbon vibrator, a link connected thereto, a rock shaft operative on said link, a crank arm on said rock shaft, a key operated universal bar, and a second link connected with said crank arm and with said universal bar, said universal bar being provided with individual contact tongues and with a strip of strengthening material, and said second link being variably engageable with said crank arm.

8. In a typewriting machine, the combination of a ribbon vibrator, a link connected thereto, a rock shaft operative on said link, a crank arm on said rock shaft, a key operated universal bar, and a second link connected with said crank arm and with said universal bar, said universal bar being U-shaped and slitted to provide individual contact tongues and carrying a strip of strengthening material below said tongues, said crank arm being provided with a depressed portion and said second link being slotted to engage slidably at varying points with said crank arm including the depressed portion thereof.

9. In a typewriting machine, the combination of a ribbon vibrator, a link connected thereto, a rock shaft operative on said link, a crank arm on said rock shaft, a key operated universal bar, and a second link connected with said universal bar and slotted to engage said crank arm and co-operate variably therewith.

10. In a typewriting machine, the combination of a ribbon vibrator, a link connected thereto, a rock shaft operative on said link, a crank arm on said rock shaft provided with a depression, a key operated universal bar, and a slotted link connected with said universal bar and co-operating variably with said crank arm, said slotted link being ineffective on said crank arm when opposite the depression therein.

11. In a typewriting machine, the combination of a ribbon vibrator, a link connected thereto, a rock shaft operative on said link, a crank arm on said rock shaft, a key operated universal bar, a second link connected with said universal bar and slotted to fit over said crank arm, and means for maintaining said slotted link set in variable relationships with said crank arm.

12. In a typewriting machine, the combination of a ribbon vibrator, a link connected thereto, a rock shaft operative on said link, a crank arm on said rockshaft, a key operated universal bar, a second link connected with said universal bar and slotted to co-operate with said crank arm, and means for maintaining said second link set in variable relationships with said crank arm, said last recited means comprising a pivoted switch having a slot in which said second link engages.

13. In a typewriting machine, the combination of a ribbon vibrator, a link connected thereto, a rock shaft operative on said link, a crank arm on said rock shaft, a key operated universal bar, a second link connected with said universal bar and slotted to co-operate with said crank arm, means for maintaining said second link set in variable relationships with said crank arm, said last recited means comprising a pivoted switch having a slot in which said second link engages, and a spring device connected to said switch.

14. In a typewriting machine, the combination of a ribbon vibrator, a link connected thereto, a rock shaft operative on said link, a crank arm on said rock shaft, a second link slotted to co-operate with said crank arm, printing keys effective to actuate said second link, and means for maintaining said second link set in variable relationships with said crank arm, said last recited means comprising a pivoted switch having a slot in which said second link engages, and a control handle pivoted on said switch and movable independently thereof to lock the switch against movement.

15. In a typewriting machine, the combination of a ribbon vibrator, a link connected thereto, a rock shaft operative on said link, a crank arm on said rock shaft, a key operated universal bar, a second link connected with said universal bar and slotted to cooperate variably with said crank arm, and means for maintaining said second link set in variable relationships with said crank arm, said last recited means comprising a pivoted, spring-mounted switch having a slot in which said second link engages, and a stop plate provided with projections for limiting pivotal movements of said switch in both directions.

16. In a typewriting machine, the combination of a ribbon vibrator, a link connected thereto, a rock shaft operative on said link, a crank arm on said rock shaft, a second link key actuated and engageable variably with said crank arm, a switching member comprising a U-shaped body portion having an upright fixed pivot and an arm projecting

from said body portion and formed with a slot engaging with said second link, and a controlling handle pivoted on said body portion and movable independently thereof.

17. In a ribbon reversing mechanism for typewriting machines, the combination of ribbon carriers, a shaft for driving said carriers in alternation, and shaft shifting means comprising key actuated members constantly connected to said shaft but that normally move ineffectively and devices operating automatically for rendering said members effective, said shifting means operating independently of the pull of the ribbon.

18. In a ribbon reversing mechanism for typewriting machines, the combination of ribbon spools, a shaft for driving said spools in alternation, and shaft shifting means comprising key actuated members constantly connected to said shaft but that normally move ineffectively and devices controlled by the ribbon plies on said spools for rendering said members effective, said shifting means operating independently of the pull of the ribbon.

19. In a ribbon reversing mechanism for typewriting machines, the combination of ribbon carriers, a shaft for driving said carriers in alternation, and shaft shifting means comprising pivoted members adapted to be swung on their pivots at each actuation of the printing keys and constantly connected to said shaft, the pivotal movements of said members being normally ineffective and ribron-controlled devices operating automatically to render members effective, said shifting means operating independently of the pull of the ribbon.

20. In a ribbon reversing mechanism for typewriting machines, the combination of ribbon spools, a shaft for driving said spools in alternation, and shaft-shifting means comprising pivoted members adapted to be swung on their pivots at each actuation of the printing keys and constantly connected to said shaft, the pivotal movements of said members being normally ineffective, and devices connected with said ribbon spools and controlled by the ribbon wound thereon for automatically rendering said members effective to shift said shaft, said devices operating independently of the pull of the ribbon.

21. In a ribbon reversing mechanism for typewriting machines, the combination of ribbon spools, a shiftable shaft operative to drive said spools in alternation, and shaft shifting means comprising key actuated bell cranks that are constantly connected to said shaft but normally move ineffectively and reversing rods connected with said spools and controlled by the ribbon wound thereon, said rods when released cooperating with said bell cranks to render them effective.

22. In a ribbon reversing mechanism for typewriting machines, the combination of ribbon carriers, a shiftable shaft operative to drive said carriers in alternation, and shaft shifting means comprising key actuated bell cranks that normally move ineffectively, reversing rods connected with said carriers and controlled by the ribbon wound thereon, and pivoted members connected with said shaft and on which said bell cranks in turn are pivoted, said rods when released cooperating with said bell cranks to render them effective to move said pivoted members and shift said shaft.

23. In a typewriting machine, the combination of ribbon spools, shafts therefor, a ribbon driving shaft shiftable to connect with said spool shafts, and means for shifting said driving shaft automatically back and forth to connect with said spool shafts, said means comprising rods housed in said spool shafts and controlled by the ribbon wound on said spools, pivoted members connected with said driving shaft, and bell cranks pivoted on said members and cooperative with said rods to move said members when the rods are released, said bell cranks normally vibrating idly when the printing keys are actuated.

24. In a front strike typewriting machine, the combination of ribbon carriers, vertical shafts on which said carriers are supported, beveled gears on said shafts, a ribbon driving shaft, pinions thereon engageable with said gears, and means for moving said driving shaft automatically back and forth to connect it alternatively with said gears, said means comprising pivoted members, bell cranks pivoted on said members, abutments controlled by the ribbon cooperative with arms of said bell cranks, links connected with the other arms of said bell cranks, another pair of bell cranks connected with said links, crank arms operative on said other pair of bell cranks, and a key controlled rock shaft on which said crank arms are secured.

25. In a front strike typewriting machine, the combination of ribbon carriers, vertical shafts on which said carriers are supported, beveled gears on said shafts, a ribbon driving shaft, pinions thereon engageable with said gears, and means for moving said driving shaft automatically back and forth to connect it alternatively with said gears, said means comprising pivoted members, bell cranks pivoted on said members, abutments controlled by the ribbon cooperative with arms of said bell cranks, and driving means connected with the other arms of said bell cranks.

26. In a front strike typewriting machine, the combination of ribbon carriers, vertical shafts on which said carriers are supported, beveled gears on said shafts, a ribbon driving shaft, pinions thereon engageable with said gears, and means for moving said driving shaft automatically back and forth to

connect it alternatively with said gears, said means comprising pivoted members, bell cranks pivoted on said members, key controlled means normally effective to move said bell cranks idly, and obstructions controlled by the ribbon effective to cause said bell cranks to actuate said pivoted members.

27. In a front strike typewriting machine, the combination of a platen; a vibratory ribbon holder comprising a slotted portion through which the ribbon is threaded and also a laterally extending arm terminating in an upward extension; a relatively stationary pivot to which said extension is pivoted; a link pivoted to said holder at the elbow formed by its arm and extension; and key actuated means for moving said link in the direction of its length.

28. In a front strike typewriting machine, the combination of a platen; a vibratory ribbon holder comprising a slotted portion through which the ribbon is threaded and an arm extending laterally and terminating in an upward extension; a relatively stationary pivot for said extension; a link pivoted to said holder at the elbow formed by its arm and extension; an upwardly extending crank arm to which the opposite end of said link is pivoted, a key actuated rock shaft to which said crank arm is secured, and a draw spring connecting said crank arm with said holder.

29. In a typewriting machine, the combination of a ribbon vibrator, a rock shaft connected thereto, a crank arm on said rock shaft, a key operated link variably engageable with said crank arm, and a switch for setting said link in varying normal relationships with said crank arm, said crank arm being adapted to contact with said switch in one of its positions to limit the throw of the vibrator.

30. In a typewriting machine, the combination of a ribbon vibrator, a rock shaft connected thereto, a crank arm on said rock shaft, a key operated link variably engageable with said crank arm, a switch for setting said link in varying normal relationships with said crank arm, said crank arm being adapted to contact with said switch in one of its positions to limit the throw of the vibrator, and a stationary stop engageable by said vibrator also to limit its throw, the stationary stop being effective when the switch is ineffective as a stop.

31. In a typewriting machine, the combination of a ribbon vibrator, a rock shaft connected thereto, a crank arm on said rock shaft, a key operated link variably engageable with said crank arm, and a switch for setting said link in varying normal relationships with said crank arm, said crank arm being adapted to cantact with said switch in one of its positions to limit the throw of the vibrator, the extent of throw limited by the stationary stop being greater than the extent of throw limited by the switch.

32. In a typewriting machine, the combination of a ribbon vibrator, a rock shaft connected thereto, a crank arm on said rock shaft, a key operated link variably engageable with said crank arm, and switch means for said link, said means being also effective as a stop to limit the vibratory movement of the ribbon.

33. In a typewriting machine, the combination of a set of levers, and a noise-reducing universal bar operative thereby said universal bar having a flange slitted transversely to provide flexible spring tongues engageable by said levers, said spring tongues alone transmitting movement from said levers to said universal bar.

34. In a typewriting machine, the combination of a set of pivoted levers, a universal bar underlying said levers and operative thereby, said bar being made of thin metal and being U-shaped or channel-like in cross section, one of the flanges of said bar being slitted transversely to provide a series of contact tongues engageable by said levers, the tongues being flexible or yielding, enabling the levers to ride over the top of the universal bar and depress it, whereby the operation is rendered substantially noiseless.

35. In a typewriting machine, the combination of a set of levers, and a noise-reducing universal bar operative thereby, said universal bar having a part slitted transversely to provide flexible spring tongues, the tongues being inclined so that the levers will first strike the free ends of the tongues, said spring tongues alone transmitting movement from said levers to said universal bar.

Signed at Middletown, in the county of Middlesex, and State of Connecticut, this 26th day of September, A. D. 1925.

GEORGE G. GOING.