

No. 696,137.

Patented Mar. 25, 1902.

J. FELBEL & C. GABRIELSON.

TYPE WRITING MACHINE.

(Application filed May 16, 1901.)

2 Sheets—Sheet 1.

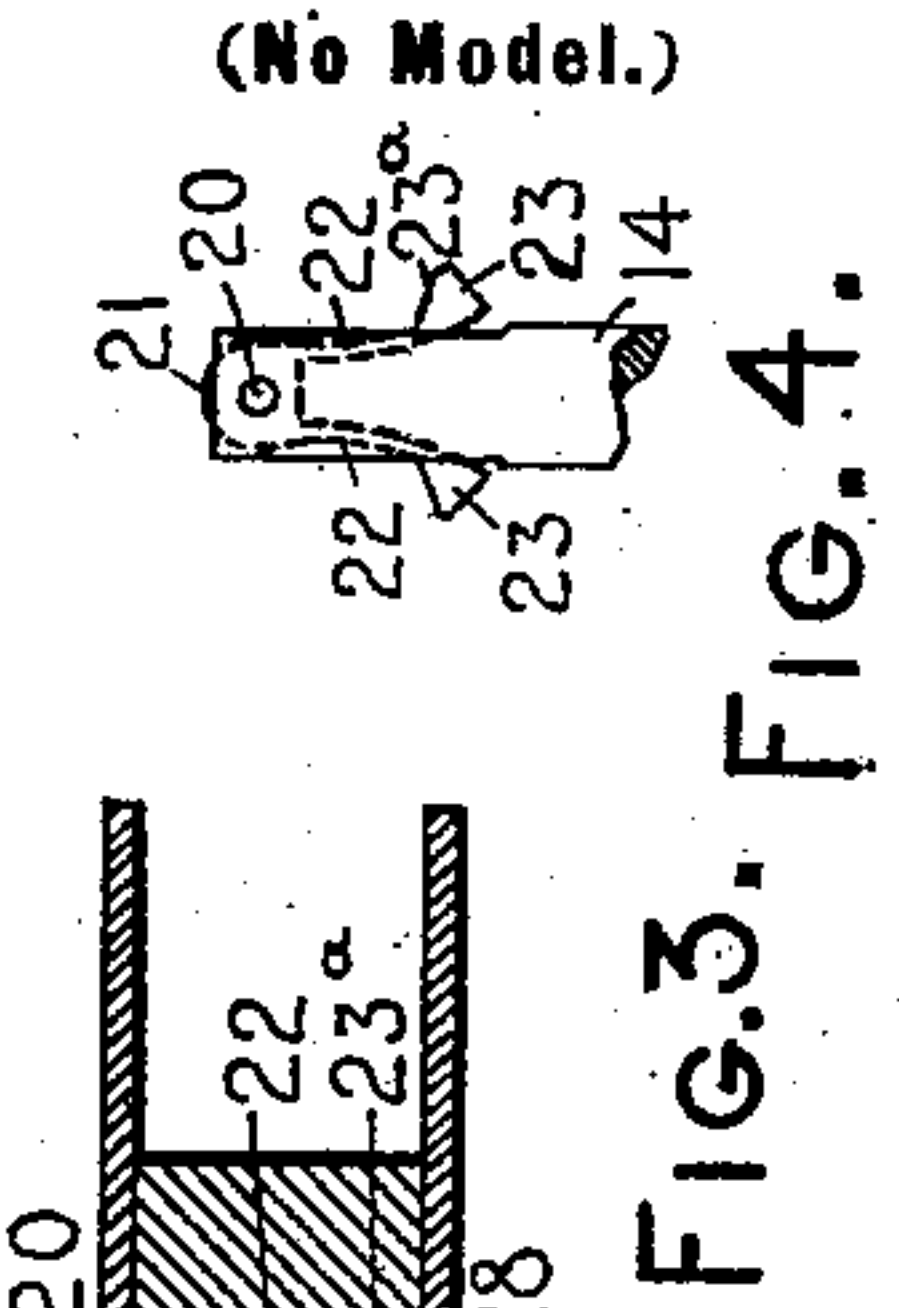


FIG. 4.

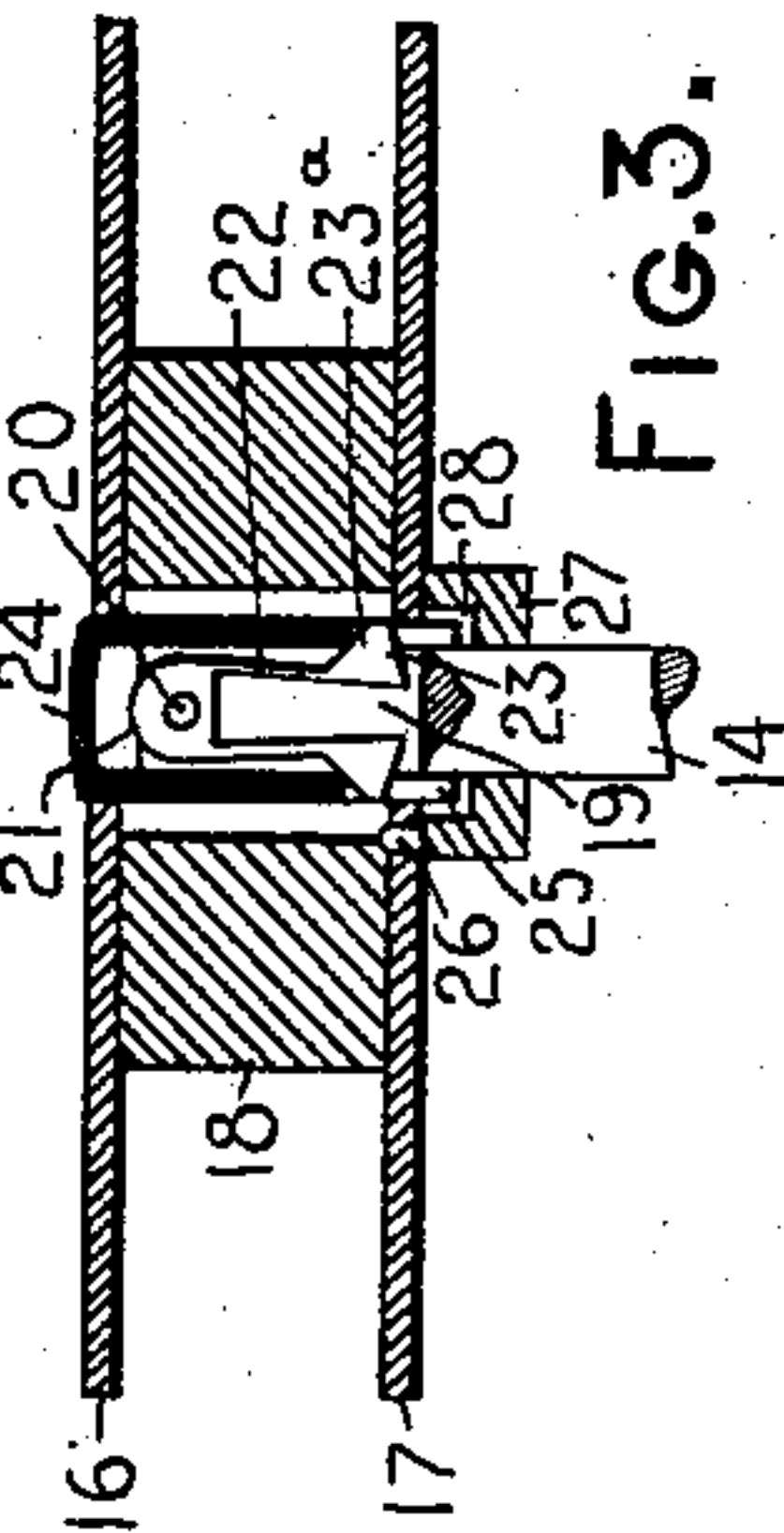


FIG. 3.

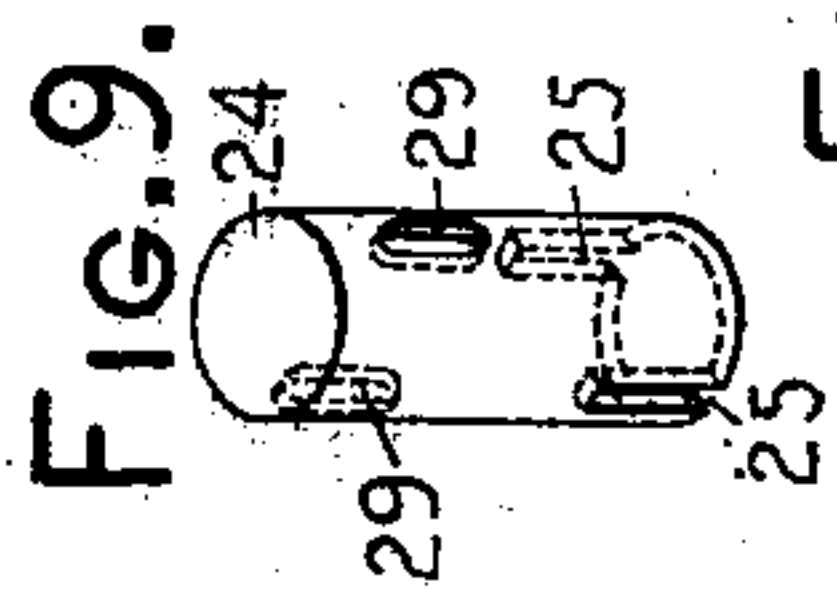


FIG. 9.

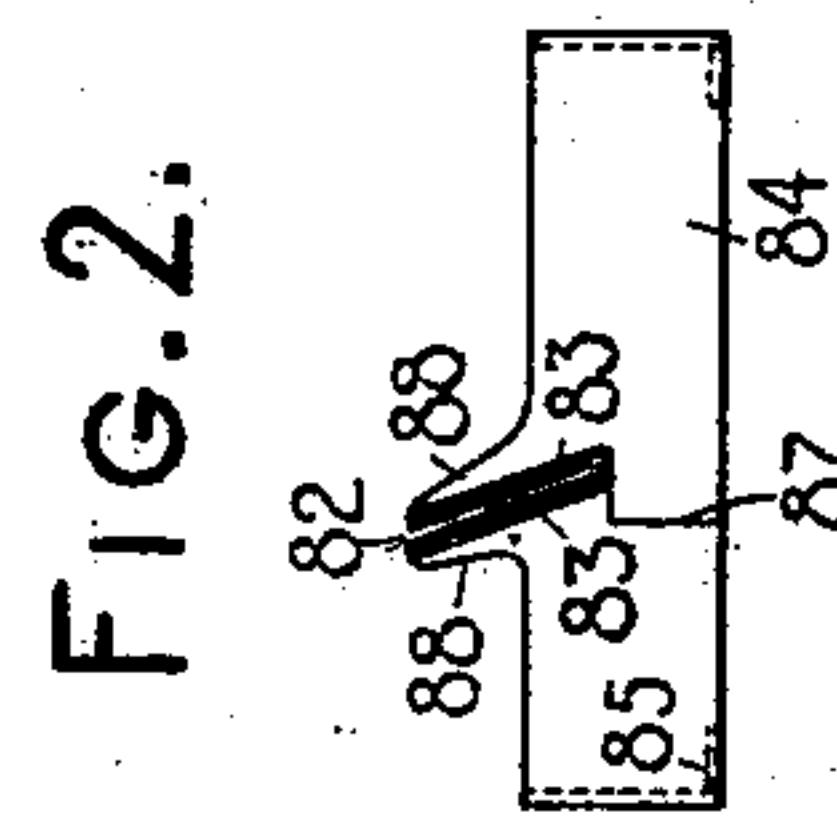
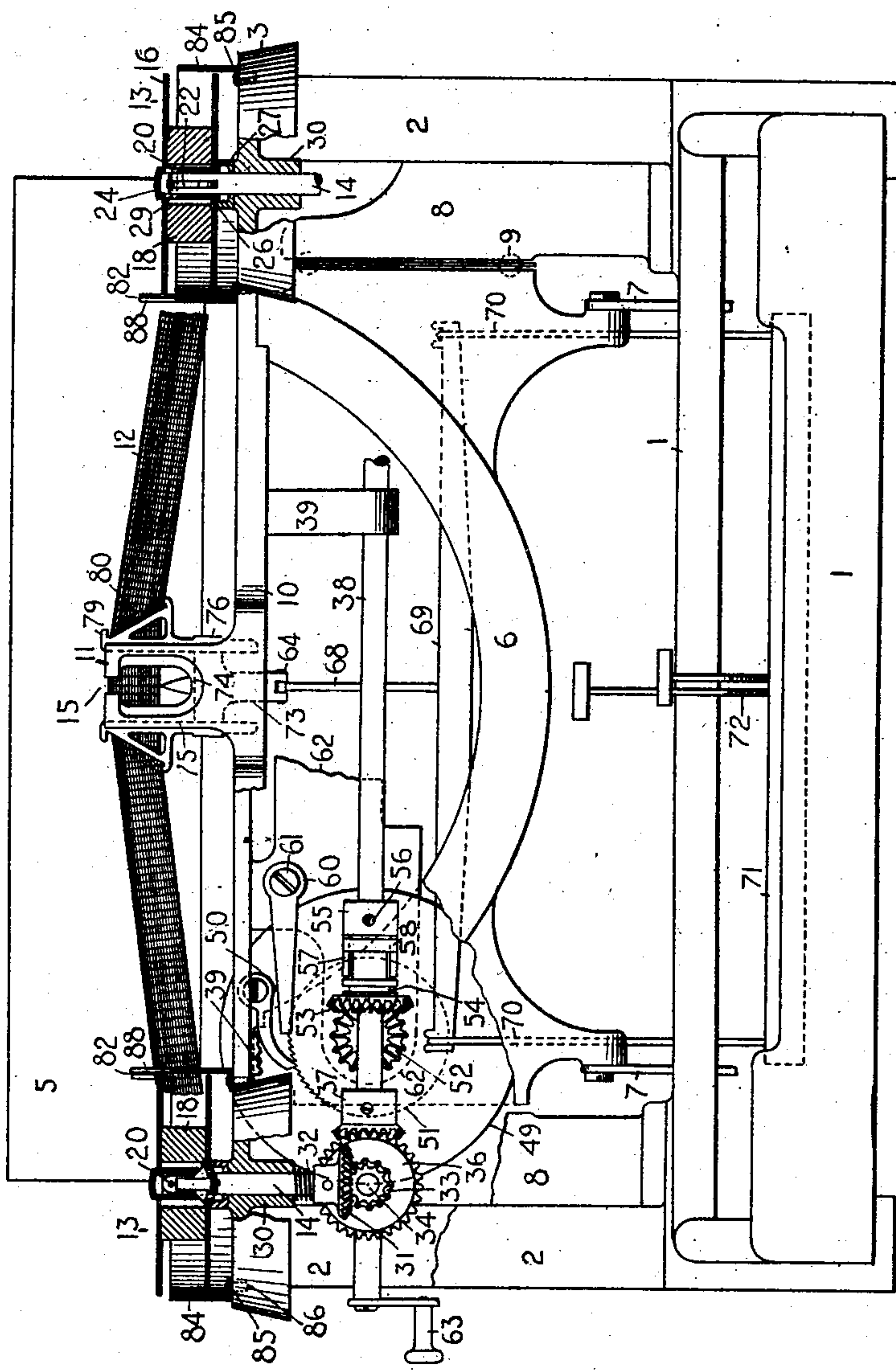


FIG. 2.

FIG. 1.



WITNESSES.

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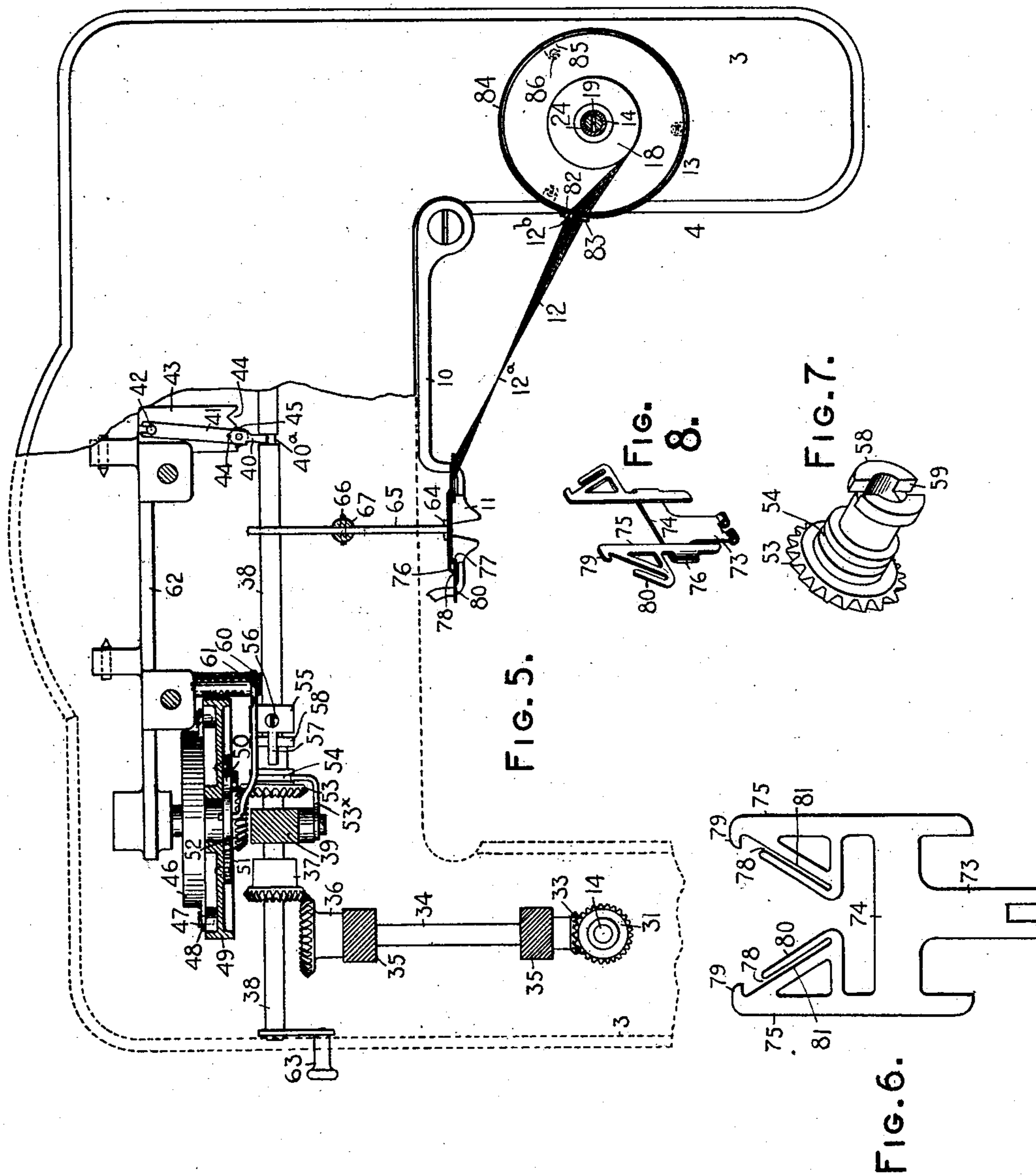
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# UNITED STATES PATENT OFFICE.

JACOB FELBEL, OF NEW YORK, N. Y., AND CARL GABRIELSON, OF GREENVILLE, NEW JERSEY; SAID GABRIELSON ASSIGNOR TO SAID FELBEL.

## TYPE-WRITING MACHINE.

SPECIFICATION forming part of Letters Patent No. 696,137, dated March 25, 1902.

Application filed May 16, 1901. Serial No. 60,534. (No model.)

*To all whom it may concern:*

Be it known that we, JACOB FELBEL, residing in the borough of Manhattan, in the city, county, and State of New York, and CARL GABRIELSON, residing in Greenville, in the county of Hudson and State of New Jersey, citizens of the United States, 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; and one of its prime objects is so to guide the ribbon in its movement across the machine from one spool and through a vibrator to the other spool as to avoid creasing or folding and cause the same to lie flat over the printing-point and also wind smoothly upon the spools.

Other objects are to facilitate the detachment of the spools and to improve the winding mechanism.

The invention consists in certain combinations of devices, features of construction, and arrangements of parts, all as will be hereinafter fully set forth, and particularly pointed out in the appended claims.

In the accompanying drawings, Figure 1 is a front elevation of a front-strike writing-machine, showing the improvements applied thereto, parts being broken away or omitted, so as to disclose the invention more clearly. Fig. 2 is a side elevation of a case for a ribbon-spool. Fig. 3 is an enlarged cross-section of a spool, illustrating the manner of releasing the same from its supporting-shaft. Fig. 4 is a detail of a ribbon-spool lock. Fig. 5 is a plan of the top plate, the left-hand side whereof is broken away, so as to disclose the ribbon-driving mechanism therebeneath. Fig. 6 is an enlarged elevation of a blank from which the ribbon-vibrator is formed. Fig. 7 is a perspective view of a clutch member for rotating the main ribbon-shaft. Fig. 8 is a perspective view of the ribbon-vibrator. Fig. 9 is a perspective view of the thimble.

In the several views similar parts are designated by similar numerals of reference.

The machine-frame comprises a base 1, corner-posts 2, and a top plate, the latter formed with a large front opening 4 for the passage

of the type-bars. (Not shown.) A platen 5 is arranged over the top plate, and a segment 6 below the platen serves as a support for the pivotal ends of the type-bars, said segment being adapted to be shifted vertically by links 7 and being guided in its shifting movements by guides 8, both the segment-frame and said guides having grooves for bearing-balls 9. The segment is also spanned by a bar 10, upon which is formed an upwardly-directed bifurcated type-guide 11.

The ribbon, which is designated as 12, extends from side to side of the machine across the type-bar opening 4 and is wound upon spools 13, mounted above the top plate upon the projecting ends of vertical shafts 14, which are arranged one at each side of the type-bar system and forwardly of the platen, the spools lying horizontally below the level of the printing-center, which is indicated at 15. The upper spool-flange is designated as 16, the lower as 17, and the cylindrical core upon which said flanges are fixed as 18. In a vertical slot 19, formed in the projecting end of each shaft 14, is mounted upon a pin 20 a catch comprising a hub-piece 21, yielding twin arms 22, extending therefrom longitudinally of the shaft, and latches 23, carried by the ends of said arms, the hub, arms, and latches being preferably integral and the latter being adapted to catch over the edges of a cylindrical perforation formed in the lower spool-flange 17, as indicated at the left of Fig. 1. A thimble-like hollow push-button 24, open at its lower end, is fitted loosely over the top of the shaft 14 and has at said lower end opposite slots 25, in which the latches 23 play, the upper ends of the slots 25 being adapted to bear upon the oblique upper edges 23<sup>a</sup> of said latches, so that by a downward or axial movement of the thimble they may be forced or cammed toward each other, as at Fig. 3, said arms 22 yielding to permit this spool-releasing movement. The central perforations in both spool-flanges match the thimble 24, which projects both above and below said flanges. The lower flange 17 is also provided with one or more eccentric perforations for receiving a short key or stud 26, projecting upwardly from a collar 27, which is fixed upon the



shaft 14, and recessed upon its upper side at 28 to receive the lower projecting end of the thimble 24, said collar resting upon the top plate 3 and sustaining the shaft 14. The pin 5 20 is elongated, so as to extend through opposite vertical slots 29, formed in the upper end of the thimble 24, whereby the latter is prevented from becoming detached from the shaft.

10 By pushing down either button 24 the upper ends of the slots 25 in the lower portion of the thimble are caused to bear upon the cam edges 23<sup>a</sup> of the latches 23 and force them inwardly from the position shown at 15 the left of Fig. 1, thereby releasing the spool, so that the latter may be lifted from the shaft. The resiliency of the arms 22 then causes the latches 23 to spring outwardly, and thereby lift the thimble 24 to normal position. In re- 20 placing the spool it is slipped over the thimble and pressed down, the edge of the cylindrical perforation in the lower flange 17 forcing the latches inwardly. The spool is then rotated until the key 26 registers with the 25 small eccentric hole in the flange, whereupon the spool is pressed down to its seat upon the collar 27 and the latches spring out and slip over the upper edge of the cylindrical perforation in the flange 17, as at Fig. 30 1, thereby preventing the spool from becoming accidentally displaced, while the stud 26 keys the spool to the shaft 14. The central perforation in the core may be of enlarged diameter to afford clearance for the latches, 35 as at Figs. 1 and 3.

Each of the shafts 14, which are journaled in bosses 30, formed upon the under side of the top plate, carries at its lower end a bevel-gear 31, a friction-spring 32 being compressed 40 between the boss 30 and the hub of said gear, so as to retard the rotation thereof and prevent the spool from unwinding too freely at any time, so that the coils of ribbon may not slip over the edge of the lower spool-flange 17. 45 Said gear 31 meshes with a bevel-pinion 33, carried by the forward end of a shaft 34, journaled in hangers 35, depending from the top plate and carrying at its rear end a bevel-gear 36, which meshes with a similar gear 37, 50 mounted upon a main transverse driving-shaft 38. The latter, it will be understood, has at its other end a second bevel-gear 37 for meshing with a gear 36, connected to the other spool, and either gear 37 may be thrown into 55 mesh and the other out of mesh by a longitudinal movement of their common shaft 38. This shaft is journaled in hangers 39 and is retained in either of its endwise positions by means of a finger 40, which engages a peripheral groove 40<sup>a</sup>, formed in the shaft, and is 60 formed upon the forward end of a detent-lever 41, whose rear end is slotted to engage a fulcrum-pin 42, projecting upwardly from a fixed block 43, the forward end of said block 65 being doubly notched at 44 and the lever being provided with an antifriction-roll 45 for engaging the notches, said lever being, as

usual, spring-pressed rearwardly, so that its roller may be detained in either notch, and hence the shaft 38 retained in either of its 70 endwise positions, whereby either gear 37 thereon is held in mesh with its companion gear 36. When the shaft is moved endwise, the lever 41 is swung upon pivot 42 and also drawn forwardly as the roller 45 rides over 75 the point between the notches, the slotted engagement of said lever with the pin 42 permitting this forward movement.

The main shaft 38 is rotated by means of the usual carriage-driving spring, the latter 80 being contained in a barrel 46, to which is fixed, by means of screws 47 and ears 48, a sheave 49, carrying the strap which usually connects the paper-carriage to the spring-barrel. To the end that the ribbon may be 85 wound during the forward movements of the carriage and the spring-barrel, but not during the return movements thereof, a pawl 50 is pivoted upon the spring-barrel and drives a ratchet-wheel 51, mounted loosely upon the 90 spring-barrel shaft, and to said ratchet-wheel is fixed a bevel-gear 52, which meshes with a similar gear 53, loosely carried upon the main ribbon-shaft 38. The gear 53 is held in mesh with the gear 52 by means of a bent 95 finger 53<sup>x</sup>, which engages a peripheral hub-groove 54, formed thereon. A collar 55, fixed upon the ribbon-shaft by a set-screw 56, is provided with parallel clutching-fingers 57, which engage a slotted head 58, also formed 100 upon the hub of the gear 53, the slots 59 in said head 58 being clearly shown at Fig. 7. The fingers 57, which slide in these slots so as to accommodate the endwise movements of the main shaft 38, are of such length as to 105 make a positive driving connection between the gear 53 and the shaft 38 at both endwise positions of the latter. Accidental reverse movement of the ratchet-wheel 51 is prevented by a gravity-pawl 60, which is pivoted by a 110 screw 61 upon the same bracket 62 which carries both the carriage-driving spring-drum and the shaft-detaining bracket 43. The shaft 38 is also provided with the usual crank 63.

The middle portion of the ribbon is at each 115 type impression moved up, so as to cover the printing-point, and then down, so as to uncover the same, by means of a vertically-reciprocating vibrator, the lower end whereof is pivotally connected at 64 to the forward 120 end of an operating-lever 65, which is pivoted between its ends at 66 in a lug 67, depending from the top plate, and is connected by a link 68 to the usual dog-rocker cross-bar 69, from which is suspended, by means of hooks 125 70, a universal bar 71, the latter passing transversely beneath the usual type-operating key-levers 72. The vibrator, which is made of thin sheet metal, comprises both an upright stem 73, whose lower end is connect- 130 ed to the lever 65, as aforesaid, and also a cross-head 74, which carries upon its ends a pair of vertical slides 75. The two arms composing the cross-head are folded back upon



themselves at 76, and the slides are hence turned toward each other, so that they may loosely clasp vertical guiding-grooves 77, formed in the outer side edges of the type-guide 11. The lower portions of the slides 75 project below and the upper portions above the cross-head 74 and are of such length that the vibrator is enabled to work freely. It will be seen that the slides are arranged laterally of the guiding device 11.

The ribbon, which passes behind the type-guide and the vibrator and in proximity to the platen, is threaded through guiding-slots 78, formed upon the laterally-arranged upper portions of the vibrator-slides 75, and is prevented from upward displacement by means of outwardly-projecting hooks or projections 79, formed upon the upper ends of the slides. The slots 78 are preferably open at the top, so as to facilitate the insertion and withdrawal of the ribbon, the guard-fingers 80, which are separated by the slots 78 from the main portion of the vibrator, extending up in rear of the ribbon.

The ribbon lies flat against the rear face of the vibrator, and hence travels longitudinally past the printing-point in a vertical plane, while the direction of its travel toward and away from the vibrator is quite oblique to said vertical plane because of the arrangement of the spools at opposite sides of the machine forwardly of and below the printing-point. Heretofore in front-strike machines of this class the vibrator ribbon-guiding slots have been vertical, and in consequence one edge of the ribbon would become taut while the other edge would be loose and baggy, and this has proved a great objection, owing principally to the tendency of the baggy or slack edge of the ribbon to become wrinkled, thus spoiling the ribbon and marring the appearance of the type impressions. In order to overcome this difficulty, the ribbon-slots 78 are arranged diagonally in the vibrator, so that they diverge from top to bottom, the angle of their divergence being made greater or less, according to the obliquity of the path taken by the ribbon in passing to and from the vibrator. Owing to the increased spread of the lower portions of the ribbon-slots gained by said divergence the objectionable slack along the lower edge of the ribbon is taken up and the longitudinal tension is rendered substantially even throughout the width of the ribbon, so that one edge is neither tighter nor looser than the other and wrinkling is prevented. Thus it will be seen that the ribbon is conducted past the printing-point in a smooth or flat condition, whether or not it constantly covers said point.

A further object of the aforesaid angular arrangement of the ribbon-slots is attained in connection with the movements of the vibrator in covering and uncovering the printing-point. Heretofore, owing to the threading of the ribbon through the vertical vibrator-slots above alluded to, the resistance on the

part of the ribbon to the lifting action of the vibrator has generally taken the form of a longitudinal tension along the upper edge of the ribbon, due to the natural downward drag thereof, while its lower edge has been correspondingly loose and baggy. The lifting action of the vibrator being applied directly to this loose lower edge, which was forced up while the upper edge moved but little, if any, it will be understood that in such prior structures the ribbon became wrinkled or shirred. By the present construction, however, the ribbon is caused to overhang or ride face-wise upon the diverging vibrator edges 81, and hence the natural downward drag of the ribbon is sustained by said edges throughout their length. The edges 81 taken together have a wedging action when rising, and assuming that the outlying portions of the ribbon are held taut it will be perceived that an upward movement of the vibrator would have practically no tendency to shir the ribbon, but only to wedge or stretch it more tightly across the vibrator, and hence that the ribbon must either rise or be rent asunder. It will therefore be understood that by separating or diverging the guiding edges 81 the latter are given more or less bite upon all portions of the width of the ribbon and cause the latter not only to stretch smoothly across the vibrator, but also to rise positively therewith, so that there is but little occasion to rely upon the lifting force applied by the vibrator directly against the under edge of the ribbon. The ribbon is conducted edgewise to and from the ribbon-vibrator at obtuse angles and is turned around said diverging edges, without, however, being folded thereover. The ribbon may be regarded as engaging the vibrator angularly saddlewise instead of vertically on edge, and if from any cause the longitudinal tension of the ribbon should be increased still the part riding over these angles would not wrinkle or fold, but would only be rendered smoother and would be even more effectively controlled by the rising vibrator. It will be understood, therefore, that one of the important functions of the diagonals 81 is to give the vibrator a more complete control of the ribbon than heretofore has been found possible, so that the latter may be reciprocated rapidly without danger of bagging or wrinkling, even though occasionally subjected to considerable longitudinal stress. So long as said diagonals perform this function it is not essential that the spools be arranged below the lever of the vibrator-slots, although this arrangement is preferred, because it renders the platen and the paper thereon more accessible to the operator.

It will be seen at Fig. 5 that the plane of the ribbon as it leaves the vibrator is oblique to the vertical plane in which it must travel when it winds upon the spool, and in order to guide it smoothly to the spool-core the ribbon is given a slight twist between the vibrator and the core, as at 12", said twist being



produced by passing the ribbon through a rearwardly-inclined guiding-slot 82, Fig. 2. This slot separates a pair of lips 83, formed obliquely upon the inner side of a bottomless spool-case 84, which is secured upon the top plate by ears 85 and screws 86, said case being formed of a curved metal strip whose ends are secured together at 87 and provided with upwardly and rearwardly extending horns or supports 88 for the guiding-lips 83. By this means the upper edge of the ribbon is deflected rearwardly at 12<sup>b</sup>. The forward lip 83 overlies the ribbon more or less, and thereby counteracts the tendency of the latter when under tension to creep upwardly and ride over the previously-wound coils or to crowd between the top flange of the spool and said coils. In practice it has been found that by the provision of the oblique guiding-slots 82 at the spools and the oblique slots 78 at the vibrator the ribbon will wind smoothly from spool to spool and may be vibrated for a considerable vertical distance at the printing-point without liability of becoming either folded or wrinkled even when subjected to considerable longitudinal stress.

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

1. In a type-writing machine, the combination of a spool-shaft having a slot, a spring-arm fixed therein and having at its free end a latch which is provided on its upper side with a cam edge, a ribbon-spool comprising a core and a flange on each end thereof, each flange having a perforation and the core having a bore or perforation of greater diameter than the perforation in the flange, a recessed supporting-collar fixed on said shaft and having a pin to engage an eccentric hole in the lower flange, and a thimble mounted to slide on said shaft and projecting above and below the spool-flanges and slotted to provide a portion to engage said cam edge.

2. In a type-writing machine, the combination of a shaft, oppositely-projecting latches mounted thereon, a spool locked upon the shaft by said latches, means for releasing the spool from the control of said latches, and independent means for both supporting and keying the spool to the shaft.

3. In a type-writing machine, the combination of a shaft, spring-arms 22 mounted thereon, latches 23 carried upon the ends of said spring-arms, a spool mounted upon said shaft and having a flange provided with a central perforation over whose edge said latches catch, cam portions 23<sup>a</sup> formed upon said latches, and thimble 24 sliding upon said shaft and having means for engaging said cam edges, whereby the latter and the spring-arms restore the thimble to normal position when the latter is relieved of pressure.

4. In a type-writing machine, the combination of a shaft, spring-arms 22 mounted thereon, latches 23 carried by the ends of said spring-arms, a spool mounted upon said shaft and having a flange provided with a central

perforation over whose edge said latches catch, cam portions 23<sup>a</sup> formed upon said latches, thimble 24 sliding upon said shaft and having means for engaging said cam edges, collar 27 fixed upon said shaft, and pin 26 carried by said collar and engaging an opening in the spool.

5. In a type-writing machine, the combination of a shaft slotted longitudinally at its end, a catch mounted in said slot upon a transverse pin 20 and consisting of hub portion 21, spring-arms 22, and latches 23 having cam edges 23<sup>a</sup>, collar 27 mounted upon said shaft, a ribbon-spool having centrally-perforated flanges and abutting against said collar 27, the edge of the perforation in one of said flanges being engaged by said latches, a thimble 24 mounted upon the shaft and extending through the spool into a recess 28 formed in said collar, slots 25 in said thimble, and pin 26 upon said collar engaging a perforation in the spool.

6. In a front-strike writing-machine, the combination with a platen, of a pair of vertical shafts arranged forwardly thereof at opposite sides of the machine, a ribbon-vibrator arranged between the spools and in proximity to the platen, a vertical slot formed in the upper end of each shaft, a cross-pin extending through each slot, integrally-formed spring-arms mounted upon said cross-pin and having portions which project from said slot, a collar fixed upon each shaft below said arms, a horizontal spool mounted upon each shaft and having upper and lower centrally-perforated flanges, the projections upon said arms engaging the edge of the perforation in the lower flange, a vertical thimble mounted upon each shaft and extending through the spool into a recess formed in said collar, vertical slots formed in the lower end of said thimble, the projections upon said arms passing through said vertical slots and having cam edges which are engaged by the upper ends of said slots, and means for keying the spool to the shaft.

7. In a type-writing machine, the combination with a platen, of a vertical spool-shaft arranged forwardly thereof, a spring-arm carried by said shaft, a latch carried upon the free end of said spring-arm, a cam edge on the upper side of said latch, a ribbon-spool mounted upon the shaft and having a flange engaged by said latch so as to prevent upward movement of the spool, a vertical slide acting on said cam edge to release the spool and reacted on by said cam edge and said spring-arm so as to be restored thereby to normal position when relieved of pressure.

8. In a type-writing machine, the combination of a shaft having a longitudinally-slotted end, a transverse pin 20 fixed in the shaft and having projecting ends, a thimble fitted loosely over the shaft and having slots engaged by the projecting ends of said pin, slots formed in the lower end of said thimble, latches formed upon yielding arms mounted in said shaft-slot and projecting through said



thimble-slots, a ribbon-spool having centrally-perforated flanges fitting over said thimble, a collar upon the shaft for supporting the ribbon-spool, and means for keying the ribbon-spool to the collar.

9. In a ribbon-winding mechanism of a type-writing machine, the combination of a pair of shafts 34, a ribbon-spool connected to each shaft, a gear 36 upon each said shaft, an endwise-movable main driving-shaft 38 having gears for meshing with the gears 36, a collar 55 fixed upon said driving-shaft and having integral clutch-fingers 57 extending longitudinally of the shaft, a gear 53 loosely placed upon the driving-shaft and having slots 59 engaged by said clutch-fingers, and also having a peripheral groove 54, a finger entering said groove and preventing the gear from moving longitudinally of the shaft, and means for rotating said gear.

10. In a type-writing machine, the combination of a platen, a ribbon-vibrator formed of sheet metal and consisting of a stem, a cross-head carried thereby, slides formed upon the opposite ends of the cross-head, the latter being folded at each end so that the slides are turned toward each other, fixed guides arranged between said slides and engaged thereby, and ribbon-guiding slots formed integrally upon said slides.

11. In a type-writing machine, the combination of a platen, a ribbon vibrator consisting of a stem, a cross-head carried thereby, and slides formed upon the opposite ends of the cross-head, the latter being folded at each end so that the slides are turned toward each other, fixed guides arranged between said slides and engaged thereby, upwardly-projecting ribbon-guiding fingers 80 formed integral with said slides, and hooks 79 also formed upon said slides and overhanging said ribbon-guiding fingers.

12. In a front-strike type-writing machine, the combination with a platen, of a pair of ribbon-spools mounted at opposite sides of the machine and forwardly of the platen, and an upright vibrator for moving a portion of the ribbon to cover and uncover the printing-point, said vibrator having downwardly-diverging slots through which the ribbon is threaded, and the ribbon being arranged to pass edgewise from said spools to the vibrator and at an angle to the latter and to turn through said diverging slots without folding.

13. In a front-strike writing-machine, the combination with a platen, of a pair of ribbon-spools mounted forwardly thereof at opposite sides of the machine and below the printing-point, and a vibrator mounted in proximity to the printing-point and having at its sides opposite downwardly-diverging ribbon-guides around which the ribbon turns without folding.

14. In a front-strike writing-machine, the combination with a platen, of a pair of ribbon-spools mounted at opposite sides of the

machine forwardly of the platen, a vibrator standing normally below the printing-point, and a vertical guide upon which said vibrator slides, the latter having ribbon-guiding slots arranged laterally of said vertical guide and diverging from their upper to their lower ends.

15. In a front-strike type-writing machine, the combination with a platen, of an upright ribbon-vibrator having downwardly and outwardly sloping side edges over which the ribbon rides facewise without folding and also having upwardly-directed fingers for passing behind the ribbon, and fixed ribbon-guides arranged at opposite sides of the machine forwardly of the vibrator.

16. In a front-strike writing-machine, the combination with a platen, of a pair of spools arranged forwardly thereof and below the printing-point and at opposite sides of the machine, a ribbon-vibrator arranged in front of the platen and in proximity to the printing-point, the spools and the vibrator being so arranged that the ribbon approaches and leaves the vibrator while traveling edgewise, and means at the vibrator for taking up slack in the lower portion of the ribbon.

17. In a front-strike writing-machine, the combination with a platen, of a pair of ribbon-spools arranged at the sides of the machine and forwardly of the platen, and means for lifting the middle portion of the ribbon between the spools to cover the printing-point, said means including a pair of diverging edges over which the ribbon rides facewise and in an unfolded condition.

18. In a front-strike writing-machine, the combination with a platen and a pair of spools arranged forwardly thereof at opposite sides of the machine, of a ribbon extending from spool to spool, means for causing the ribbon to travel in a vertical plane past the printing-point, means for conducting the ribbon edgewise toward and away from the printing-point in a direction oblique to said vertical plane and without folding the ribbon, and means for taking up slack in the lower edge of the ribbon.

19. In a front-strike writing-machine, the combination with a platen and a pair of spools located forwardly thereof and at opposite sides of the machine, of a vibrator arranged forwardly of the printing-point and having a rear vertical face behind which the ribbon travels, and slots 78 arranged diagonally in the vibrator and diverging from top to bottom, the ribbon being threaded through said slots and, without folding, extending outwardly and forwardly to the ribbon-spools.

20. In a front-strike writing-machine, the combination with a platen, of a pair of ribbon-spools arranged forwardly thereof upon opposite sides of the machine, a vertically-moving vibrator having oppositely-diverging edges 81, and a pair of fixed guides for controlling the direction of travel of the ribbon



so that the latter is caused to ride facewise over said edges 81 without folding.

21. In a type-writing machine, the combination of a platen, a ribbon-vibrator formed of sheet metal and consisting of a stem, a cross-head carried thereby, and slides formed upon the opposite ends of the cross-head, the latter being folded at each end so that the slides are turned toward each other, fixed guides arranged between said slides and engaged thereby, and diverging ribbon-guiding slots formed upon said slides.

22. In a front-strike writing-machine, the combination with a platen and a pair of horizontally-disposed ribbon-spools arranged forwardly thereof and at opposite sides of the machine, of a vertically-disposed vibrator arranged in proximity to the printing-point, and means between the vibrator and each spool for giving the ribbon a twist and preventing it from creeping or working over toward the end of the spool.

23. In a front-strike writing-machine, the combination with a platen and a pair of ribbon-spools arranged forwardly thereof and at opposite sides of the machine, of a vibrator arranged in proximity to the printing-point, and upright rearwardly-inclined ribbon-guiding slots arranged in proximity to the spools for preventing the ribbon from creeping or working upwardly upon the spools.

24. In a front-strike writing-machine, the combination with a platen, of a pair of spools arranged forwardly thereof and at opposite sides of the machine, a vibrator having diverging ribbon-guiding slots and arranged in proximity to the printing-point, and rear-

wardly-inclined ribbon-guiding slots arranged at the spools.

25. In a front-strike writing-machine, the combination with a platen, of a pair of horizontal ribbon-spools arranged forwardly thereof and at opposite sides of the machine, a spool-case 84 for each spool having rearwardly-inclined guiding-lips 83, and a vertically-movable vibrator having diverging ribbon-guiding slots and arranged in proximity to the printing-point.

26. In a front-strike writing-machine, the combination with a platen, of a pair of horizontal ribbon-spools arranged forwardly thereof at opposite sides of the machine, and spool-cases 84 each formed of a curved metal strip whose ends are secured together and provided with upwardly and rearwardly extending horns or supports 88 for inclined ribbon-guiding lips 83.

27. In a front-strike writing-machine, the combination of a platen, a ribbon-vibrator, a pair of flanged ribbon-spools, and spool-cases having each an inclined edge for directing the ribbon to the spool and for preventing the ribbon from working endwise of the spool and crowding between coils of the ribbon and the flange of the spool.

Signed at the borough of Manhattan, city of New York, in the county of New York and State of New York, this 9th day of May, A. D. 1901.

JACOB FELBEL.  
CARL GABRIELSON.

Witnesses:

K. V. DONOVAN,  
E. M. WELLS.