

924,590.

G. H. SMITH.
TYPE WRITING MACHINE.
APPLICATION FILED DEC. 29, 1903.

Patented June 8, 1909.
8 SHEETS—SHEET 1.

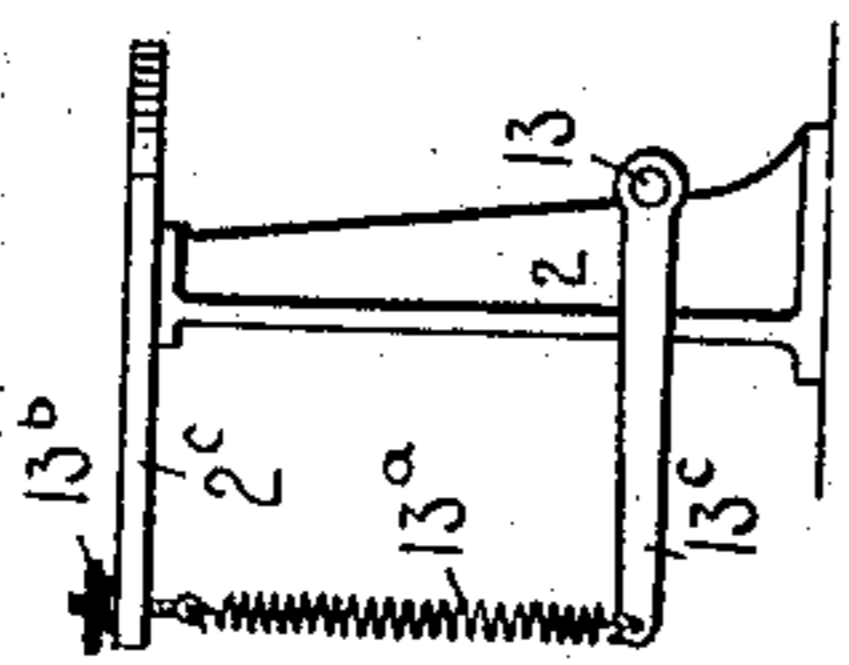
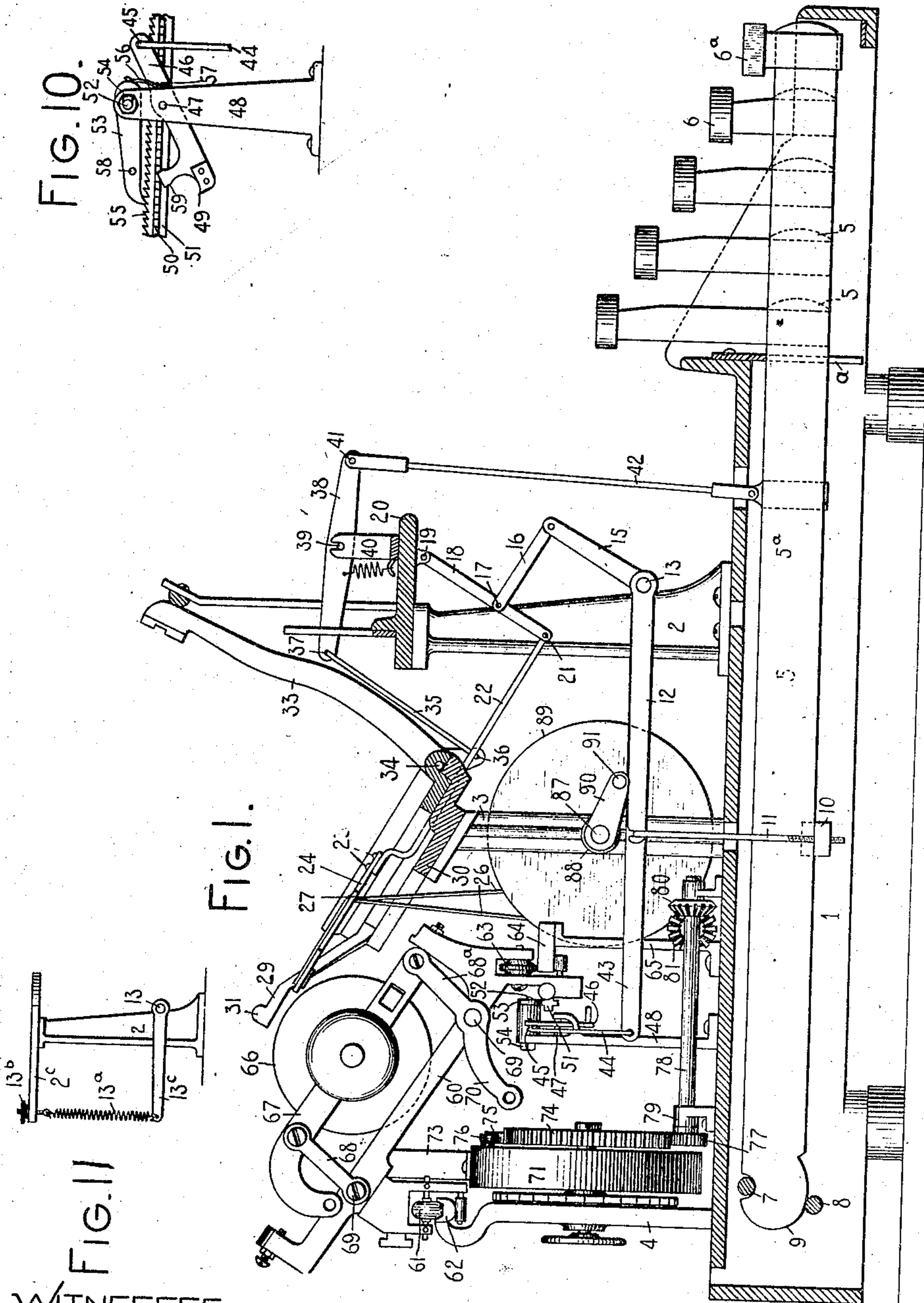
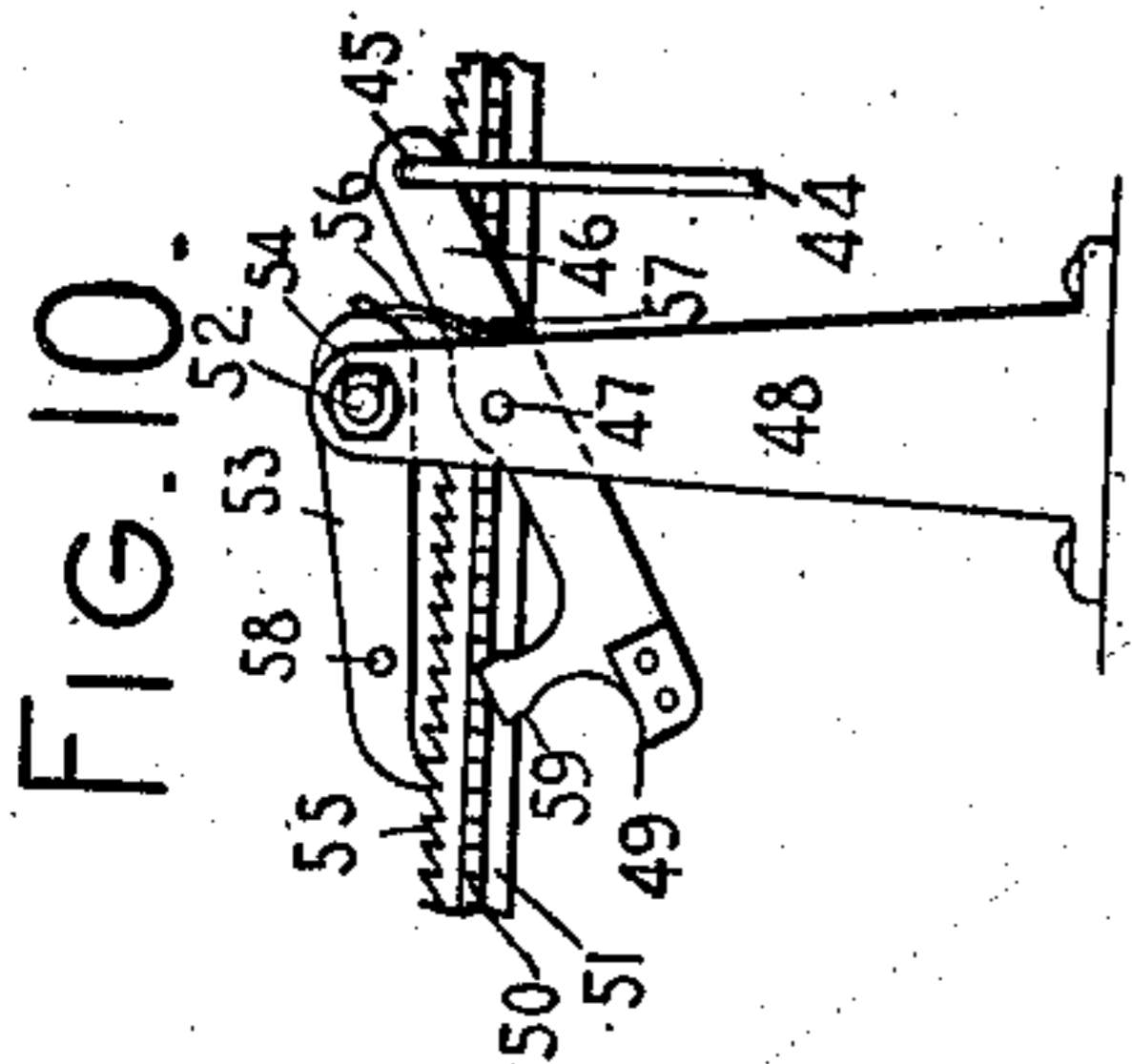


FIG. 11

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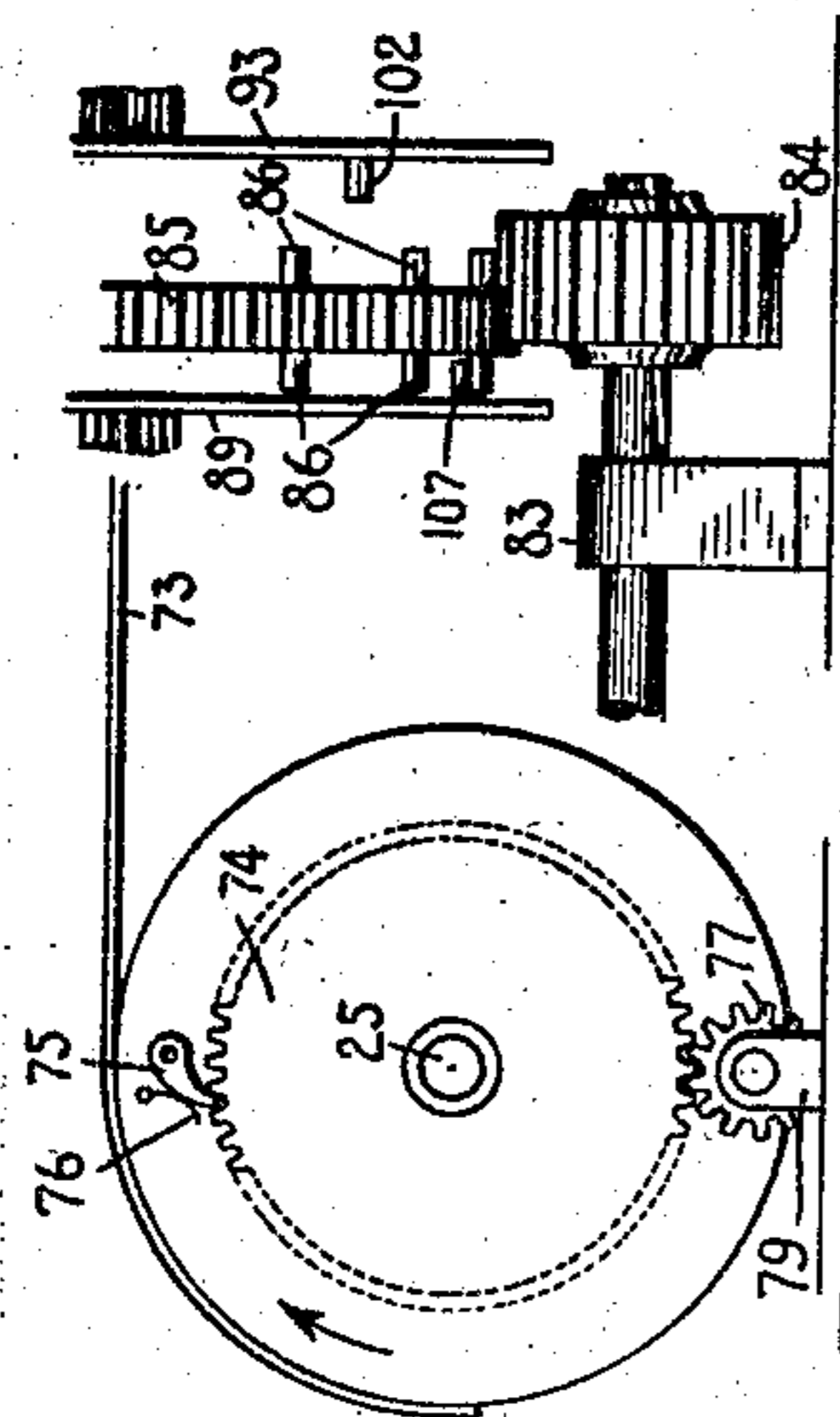
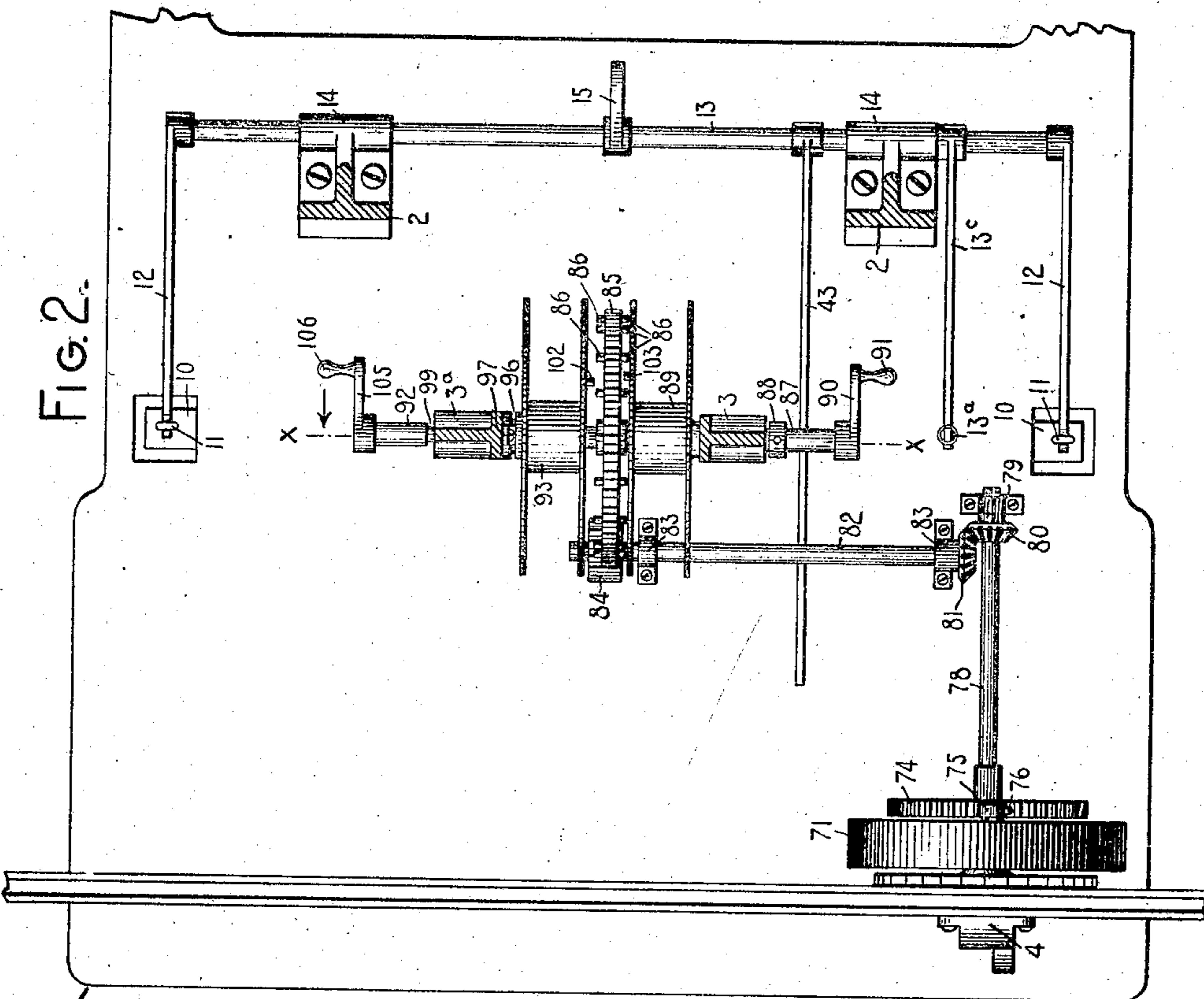


FIG. 3.

FIG. 4.

FIG. 5.

FIG. 6.



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UNITED STATES PATENT OFFICE.

GEORGE H. SMITH, OF NEW YORK, N. Y., ASSIGNOR TO UNION TYPEWRITER COMPANY, OF JERSEY CITY, NEW JERSEY, A CORPORATION OF NEW JERSEY.

TYPE-WRITING MACHINE.

No. 924,590.

Specification of Letters Patent.

Patented June 8, 1909.

Original application filed April 21, 1900, Serial No. 13,773. Divided and this application filed December 29, 1903. Serial No. 186,976.

To all whom it may concern:

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

My invention relates to typewriting machines and more particularly to ribbon mechanism therefor, and the object of said invention is to provide simple and efficient mechanism of the character specified.

To the above and other ends which will hereinafter appear, my invention consists in the features of construction, arrangements of parts and combinations of devices to be hereinafter described and claimed.

In the accompanying drawings, wherein like reference characters indicate corresponding parts in the various views, Figure 1 is a vertical front to rear sectional view of one form of typewriting machine embodying my invention. Fig. 2 is a plan view of the machine with parts above the base plate sectioned away; the view illustrating the ribbon feed mechanism. Fig. 3 is a detail front elevation of the spring drum and certain of its associated parts. Fig. 4 is a fragmentary edge view of the driving pinion and gear wheel, showing the coöperation thereof with the ribbon spools. Fig. 5 is a detail perspective view of the ribbon vibrator and type guide. Fig. 6 is a detail plan view of the ribbon vibrator. Fig. 7 is an enlarged detail vertical sectional view of the ribbon spools and certain of the associated parts, the view being taken on the line *x, x* of Fig. 2 and looking in the direction of the arrow at said line. Fig. 8 is an enlarged detail vertical sectional view taken on the line *y, y* of Fig. 7 and looking in the direction of the arrow at said line. Fig. 9 is an enlarged detail side elevation of the spring drum and the parts associated therewith. Fig. 10 is a detail fragmentary rear elevation of the escapement mechanism. Fig. 11 is a detail side elevation showing the means for restoring the ribbon vibrator and associated parts to normal position.

The present case is a division of my application Serial No. 13,773, filed April 21, 1900, which latter is a division of an application filed by me on the 16th day of June, 1897, Serial No. 640,951.

The base 1 of the machine is surmounted by upright standards or posts 2, 3, 3^a and 4. Key levers 5 are provided with finger keys 6 and are pivoted within the base of the machine upon a single pivot wire 7 that extends from side to side of the machine. A second rod or wire 8 extends from side to side of the machine and coöperates with the rounded portion 9 on each of the key levers, which rounded portion is substantially concentric with the pivot wire 7 whereas the key levers are guided in their vertical movements by a guide comb *a*. Extending transversely beneath the various key levers and the character keys, as well as the key levers 5^a of the space bar 6^a, is a universal bar 10 that has upright connecting wires 11 having hook-like ends which are received within depressions in the rear end of the crank arms 12, extending rearwardly from the rock shaft 13 that is supported in bearings 14 in the post 2. Extending upwardly and forwardly from the rock shaft 13 is a centrally disposed crank arm 15, pivoted at its upper end to a link 16, and said link is in turn pivoted at 17 to a link 18 that has its upper end pivoted at 19 to a depending lug on the segment or support 20. The lower end of the link 18 is pivoted at 21 to an inclined rearwardly extending rod 22, the rear end of which is rigidly connected at 23 to a ribbon guide or vibrator 24 constructed as indicated in Fig. 5 with inclined slots 25 through which the ribbon 26 passes and with guide fingers 27 that prevent the ribbon from being displaced laterally from the ribbon vibrator. An opening 28 is provided within the vibrator to afford an impact of the type against the ribbon as it moves through the ribbon guide or vibrator. A center type guide, comprising guide arms 29, is rigidly secured to the type bar segment 30. These guide arms extend upwardly and rearwardly in opposite directions to points adjacent to the printing point and each arm terminates in a guide face 31 with which the type bars coöperate to properly guide them in their movements to the printing positions. Each guide arm 29 is provided on its underside with a guiding lug or hook 32 that receives the ribbon vibrator and supports and guides it in its movement to and from the printing point.

Each of the type bars 33 of the segmentally arranged series (only one of which is

shown) is pivoted at 34 in the inclined type bar segment 30 and is adapted to move rearwardly to the printing position. The heel of each type bar has a link 35 connected thereto at 36, the opposite end of each link being connected at 37 to a horizontally disposed sub-lever 38, pivoted on a pivot wire 39 which is supported in a slotted segment 40. The forward end of each sub-lever is pivotally connected at 41 to an upright link 42, the lower end of which is connected to the associated key lever.

Extending rearwardly from the rock shaft 13 is a crank arm 43 that has its rear end connected to an upwardly extending link 44, which in turn is connected at 45 to a feed dog 46, that is in the nature of a lever, pivoted at 47 to an upwardly extending standard 48. The nose 49 of this feed dog is adapted to cooperate with the teeth 50 on a feed rack 51. Pivoted at the upper end of the standard 48, as indicated at 52, is a stepping dog 53 which is slotted, as indicated at 54 in dotted lines in Fig. 10, in order to afford a longitudinal movement of the stepping dog in the general direction of the movement of the rack 51, as well as to receive a pivotal movement around the pivot 52 thereof and the stepping dog is adapted to engage the teeth 55 on the upper side of the feed rack.

A leaf spring 56 is secured at one end 57 to the standard 48 and bears at its free end against the stepping dog and tends to force it from right to left in Fig. 10. A pin 58 projects laterally from the stepping dog and extends into the path of an arm 59 which projects from the holding dog 46. It will therefore be understood that a depression of any of the character keys 6 or the spacing key or bar 6^a will effect a downward movement of the universal bar, thereby turning the rock shaft 13. This movement is effective to interpose the ribbon, through the ribbon vibrator and intermediate connections between the vibrator and the rock shaft 13, in the path of the type. This same movement of the rock shaft 13 effects a downward movement of the crank arm 43, thereby giving an upward movement to the engaging nose 49 of the holding dog in order to bring the same into cooperation with the teeth 50 on the rack bar 51. This movement of the holding dog brings the arm or abutment 59 into engagement with the pin 58 on the stepping dog, thus forcing it out of engagement with the teeth 55 on the rack and enabling it to be advanced under the tension of its spring 56 to a position to engage the next tooth 55 on the rack. When the pressure on the finger key is released, the holding dog will recede to its normal position illustrated in Fig. 10 and the stepping dog will, during the same movement, engage the teeth 55 opposite which it has been moved. The tension of

the carriage spring will then be effective to move the stepping dog against the tension of its spring 56, thus affording a letter space movement of the carriage. The movements of the rock-shaft 13 and the parts connected thereto to normal positions, when pressure on a finger key is released, is effected by a spring 13^a (Figs. 2 and 12) connected at one end to the segmental support 20 by an adjusting screw 13^b by means of which the tension of the spring may be varied; the opposite end of the spring being connected to a crank arm 13^c secured to the rock-shaft 13.

The carriage 60, in the present instance, is provided with rollers 61 which bear upon 80 fixed tracks 62 that are supported by the standards 4. The forward portion of the carriage carries one or more rollers 63 that bear upon a fixed track 64, that in turn is supported upon an upright or standard 65. The platen 66 is adapted to turn in a platen frame 67 supported upon parallel links 68 and 68^a pivoted at 69 to the carriage. One of the links 68^a is provided with a depending extension 70 through which motion is communicated by suitable means (not shown) to effect a transverse movement of the platen in an inclined plane in order to afford upper or lower case writing.

A spring drum 71 is supported and adapted to revolve on a spindle 72 that receives its support from one of the standards 4. The spring drum is connected in the usual manner by a band 73 to the carriage in order to afford a step-by-step movement thereof during the operation of the machine. A gear wheel 74 is loosely supported upon the spindle 72 adjacent the forward side of the spring drum and a pawl 75 is pivoted to the drum and adapted to engage the peripheral teeth of the gear wheel 74. This pawl is forced into engaging position by a spring 76 connected at one end to the drum and bearing at its free end against the pawl. From an examination of Fig. 8 it will be seen that the disposition of the pawl 75 is such that it affords a rotation of the spring drum in the direction of the arrow independently of the gear wheel 74 but that in the rotation of the spring drum in an opposite direction, the pawl engages the gear and causes it to rotate with the spring drum so that the wheel 74 and the parts controlled thereby are always turned in one direction. The last mentioned movement of the spring drum is that effected during the movement of the carriage from right to left or in the direction of its feed, whereas the independent movement of the spring drum and gear wheel is that effected during the return of the carriage.

A driving pinion 77 meshes with the gear 74 and is secured to a shaft 78 that is supported in bearings 79 secured to the base of the machine. The forward end of the shaft 78 has a bevel gear 80 secured thereto, said

bevel gear meshing with a second bevel gear 81 secured to one end of a shaft 82 that turns in bearings 83 secured to the base of the machine. The opposite end of the shaft 82 has a driving pinion 84 secured thereto and this pinion meshes with a driving wheel 85 which is provided on opposite sides thereof with oppositely disposed engaging projections or pins 86 which are circularly arranged, as indicated in Fig. 8, and are spaced at regular distances apart.

A bearing is provided in a standard 3 for a shaft 87 that has a collar 88 thereon to prevent a longitudinal movement of the shaft in one direction. The inner end of the shaft 87 has secured thereto a ribbon spool 89 that is adapted to bear against the standard 3 and prevent a longitudinal movement of the shaft in one direction, so that the collar 88 and the ribbon spool 89 cooperate to prevent a longitudinal displacement of the shaft 87. A crank arm 90 is secured to the outer end of the shaft 87 and a finger piece 91 is secured to the crank arm in order to afford means for turning the ribbon spool 89 by hand.

The standard 3^a has a bearing for the reception of a shaft 92 which is aligned with the shaft 87. The shaft 92 supports a ribbon spool 93 which carries a pin 94 in the hub thereof, said pin extending into a spline groove 95 in the shaft 92, thus forming a connection between the shaft and ribbon spool 93 that causes the ribbon spool to turn with the shaft but affords a longitudinal movement of the shaft independent of the spool. The hub of the spool 93 is extended beyond one of the flanges thereof and has a peripheral groove 96 for cooperation with an engaging finger 97 that is secured at 98 to the standard 3^a and prevents an axial movement of the ribbon spool 93 during the longitudinal movement of its shaft but affords a free turning movement of the spool with its shaft. This shaft 92 is provided with two peripheral grooves 99, in either of which the free end of a latch 100 is adapted to engage to maintain the shaft 92 against longitudinal displacement. The latch consists merely of a finger which is pivoted at 101 and is adapted to be turned on its pivot into or out of either of the grooves 99 in the shaft.

The ribbon spool 93 is provided with a projection or pin 102 on the flange thereof adjacent to the driving wheel 85 and said pin is adapted to project into the path of any of the projections of pins 86 on the driving wheel. The ribbon spool 89 is likewise provided with a pin or projection 103 on the flange thereof which is adjacent to the driving wheel and this pin is likewise adapted to engage the pins 86 on the driving wheel. From an examination of Fig. 7 it will be observed that the driving wheel 85

is loosely mounted on the inner end of the shaft 92 and is prevented from axial displacement on the shaft by collars 104 secured to the shaft on opposite sides of the driving wheel. The shaft 92 is also provided with a crank arm 105 that has a finger piece 106 by which the ribbon spool 93 may be turned and by means of which a longitudinal displacement of the shaft 92 may be effected. This longitudinal movement of the shaft 92 is effective to produce an axial movement of the driving wheel 85 and such axial movement is effective to throw the pins 86 on one side of the driving wheel out of cooperation or engagement with the pin 102 or 103 of a ribbon spool and to throw the pins 86 on the opposite side of the driving wheel into engagement with the engaging pin on the other spool. The gear wheel 85, as heretofore pointed out, meshes with the driving pinion 84 which is of such width as to afford a constant engagement between the driving pinion and driving wheel, irrespective of the axial disposition of the driving wheel.

From the foregoing description, it will be understood that either ribbon spool may be turned through its crank and finger piece in order to effect a manual feed of the ribbon. During the operation of the machine a step-by-step movement of the carriage in the direction of its feed is effective to turn the gear wheel 74 through the pawl 75 on the spring drum. This movement of the gear wheel is transmitted through the pinion 77, shaft 78, bevel gears 80 and 81, shaft 82 and driving pinion 84 to the driving wheel 85, and the ribbon spool which is engaged therewith will be rotated to effect a longitudinal feed of the ribbon. During the return movement of the carriage from left to right the pawl 75 rides freely over the teeth of the wheel 74 and the ribbon feed mechanism remains at rest. When an end of the ribbon has been reached, it is merely necessary to release the latch 100 and move the shaft 92 longitudinally in order to effect an axial movement of the driving wheel 85 to shift it out of engagement with the ribbon spool on which the ribbon has been fully wound and to effect an engagement of the driving wheel with the empty spool. The latch is then turned into a depression 99 to lock the shaft 92 against accidental longitudinal displacement and a further feed of the ribbon is effected on the empty spool.

It will be seen that the ribbon spools are arranged side by side on independent aligned shafts; that the driving wheel 85 is interposed between the ribbon spools and revolves on the same axis of rotation as the parallel ribbon spools and receives an axial movement to effect a direct connection between said driving wheel and a ribbon spool; that the movement which effects a connection be-

tween the driving wheel and one ribbon spool at the same time effects a disconnection between the driving wheel and the other spool, and that I have provided ribbon mechanism which is simple in construction and efficient and positive in use.

While I have shown the features of my present invention applied to a visible writing machine of the character shown in my applications Serial Nos. 13,773 and 640,951, it should be understood that from certain aspects of the invention, and so far as certain features thereof are concerned, it is immaterial what type of machine the invention is applied to and it should be further understood that various changes may be made without departing from the spirit of my invention.

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

1. In a typewriting machine, the combination of ribbon spools, mounted side by side on independent shafts, a driving wheel loosely mounted on one of said shafts and adapted to be brought into direct engagement with either of said ribbon spools.
2. In a typewriting machine, the combination of two ribbon spools mounted on independent shafts and each connected to turn with its shaft, and a driving wheel loosely mounted on one of said shafts and adapted to be brought into engagement with either of said ribbon spools to afford a turning thereof.
3. In a typewriting machine, the combination of a carriage, a spring drum, two ribbon spools mounted on independent shafts and each connected to turn with its shaft, a driving wheel loosely mounted on one of said shafts and adapted to be brought into engagement with either of said ribbon spools to afford a turning thereof, and geared connections from said spring drum to said driving wheel.
4. In a typewriting machine, the combination of supports, ribbon spools mounted on said supports side by side near the center of the machine and having engaging devices on the inner sides thereof, a single driving wheel that is interposed between and is situated adjacent to both of said ribbon spools and has engaging devices on the sides thereof, said single driving wheel and both said spools being arranged between said supports, and hand actuated means operable at will for effecting an axial movement of said driving wheel to effect an engagement thereof with one ribbon spool and a disengagement thereof from the other ribbon spool.
5. In a typewriting machine, the combination of a carriage, a spring drum therefor, ribbon spools having coincident axes of rotation and being mounted side by side situated near the center of the machine and having oppositely disposed pins projecting from the inner sides thereof, a single driving wheel

that is interposed between and is situated adjacent to both of said ribbon spools and has oppositely disposed pins that project from the sides thereof and which are adapted to be brought into engagement with the pins on said ribbon spools, hand actuated means operable at will for affording an axial movement of said driving wheel to effect an engagement thereof with one ribbon spool and a disengagement thereof from the other ribbon spool and for rotating said shaft to turn the ribbon spools, and geared connections between said spring drum and the driving wheel.

6. In a typewriting machine, the combination of a carriage, a spring drum therefor, ribbon spools that are mounted side by side and have the same axis of rotation, and a single interposed gear wheel that rotates on an axis coincident with the axis of rotation of the ribbon spools, said gear wheel being adjacent to both spools, hand actuated means operable at will for effecting an axial movement of the gear wheel and for rotating the same, means for effecting an engagement between the gear wheel and one of said ribbon spools and for effecting a disengagement between the gear wheel and the other ribbon spool by the said axial movement of said gear wheel, and connections independent of said hand actuated means between said spring drum and gear wheel and which afford a rotation of the gear wheel always in the same direction.

7. In a typewriting machine, the combination of two independently actuated hand operated alined shafts, a ribbon spool mounted on each shaft, and a driving wheel interposed between said ribbon spools and on the same axis of rotation as the spools, and means for effecting an engagement between said driving wheel and either of said ribbon spools.

8. In a typewriting machine, the combination of a carriage, a spring drum therefor, two independently actuated hand operated alined shafts, a ribbon spool mounted on each shaft, a driving gear interposed between said ribbon spools and on the same axis of rotation as the spools, means for effecting an engagement between said driving gear and either of said ribbon spools, and connections between said spring drum and driving gear.

9. In a typewriting machine, the combination of two independently actuated hand operated alined shafts, a ribbon spool mounted on each shaft to turn therewith, a driving wheel loosely mounted on one of said shafts and interposed between said ribbon spools, and means for affording an axial movement of said driving wheel to connect it to one of said ribbon spools and disconnect it from the other.

10. In a typewriting machine, the combina-

tion of two independently actuated hand operated alined shafts, one of which is adapted to receive a longitudinal movement, a ribbon spool mounted on each of said shafts and having a fixed position axially considered, and a driving wheel loosely mounted on one of said shafts and adapted to be brought into connection with either of said ribbon spools by a longitudinal movement of the longitudinally movable shaft.

11. In a typewriting machine, the combination of a carriage, a spring drum, two independently actuated hand operated alined shafts, one of which is adapted to receive a longitudinal movement, a ribbon spool mounted on each of said shafts and having a fixed position axially considered, a driving wheel loosely mounted on one of said shafts and adapted to be brought into connection with either of said ribbon spools by a longitudinal movement of the longitudinally movable shaft, and connections from said spring drum to said driving wheel to turn it during the travel of the carriage.

12. In a typewriting machine, the combination of two independently actuated hand operated alined shafts, one of which is adapted to receive a longitudinal movement, a ribbon spool mounted on each of said shafts and having a fixed position axially considered, oppositely disposed engaging projections on said ribbon spools, a driving wheel interposed between said ribbon spools and loosely mounted on one of said shafts, and oppositely disposed engaging projections on said driving wheel which are adapted to be brought into engagement with the projections or projections on either of said ribbon spools by a longitudinal movement of the longitudinally movable shaft.

13. In a typewriting machine, the combination of two independently actuated alined shafts, independent hand actuated means for rotating each of said shafts, means for affording a longitudinal movement of one of said shafts, a ribbon spool mounted on each shaft, the ribbon spool on the longitudinally movable shaft being splined thereto and fixed against axial movement with the shaft, a driving wheel interposed between said ribbon spools and loosely mounted on the longitudinally movable shaft, and means for effecting an engagement between the driving wheel and either of said ribbon spools by a longitudinal movement of said longitudinally movable shaft.

14. In a typewriting machine, the combination of a carriage, a spring drum therefor, two independently actuated alined shafts, independent hand actuated means for rotating each of said shafts, means for affording a longitudinal movement of one of said shafts, a ribbon spool mounted on each shaft, the ribbon spool on the longitudinally movable shaft being splined thereto and fixed

against axial movement with the shaft, a driving gear interposed between said ribbon spools and loosely mounted for rotation on the longitudinally movable shaft but adapted to receive an axial movement therewith, means for effecting an engagement between the gear wheel and either of said ribbon spools by a longitudinal movement of said longitudinally movable shaft, a driving pinion with which said driving gear is in constant mesh, and connections from said spring drum for rotating said driving pinion during the travel of the carriage.

15. In a typewriting machine, the combination of a carriage, a spring drum therefor, a gear wheel that is connected to rotate with said drum in one direction, a pinion that meshes with said gear, a driving wheel that is driven from said pinion, ribbon spools, and means effecting a direct engagement between said driving wheel and either of said ribbon spools.

16. In a typewriting machine, the combination of a carriage, a spring drum therefor, a gear wheel that turns on the same axis as the drum, a pawl carried by the drum and engaging said gear wheel so as to connect the gear to rotate with said drum in one direction, a pinion that meshes with said gear, a driving wheel that is driven from said pinion, ribbon spools, means effecting an axial movement of the driving wheel, and means for causing a direct engagement between the driving wheel and either of said ribbon spools by an axial movement of the driving wheel.

17. In a typewriting machine, the combination of a carriage, a spring drum therefor, a gear wheel on the same axis of rotation as the drum, a pawl carried by the drum and engaging said gear wheel, a driving pinion with which said gear wheel meshes, a driven pinion, intermediate connections between said driving and driven pinions, a driving wheel turned by said driven pinion, ribbon spools on opposite sides of said driving wheel, and means for effecting an axial movement of said driving wheel to throw it into direct engagement with one of said ribbon spools and out of engagement with the other spool.

18. In a typewriting machine, the combination of a carriage, a spring drum therefor, a gear wheel on the same axis of rotation as the drum, a pawl carried by the drum and engaging said gear wheel, a driving pinion with which said gear wheel meshes, a driven pinion, intermediate connections between said driving and driven pinions, a driving wheel turned by said driven pinion, ribbon spools on opposite sides of said driving wheel, and the axis of rotation of which is coincident with the axis of rotation of said driving wheel, independent alined shafts on which said spools are mounted, independent hand

actuated means for turning said shafts, and means for effecting an axial movement of said driving wheel to throw it into engagement with one of said ribbon spools and out of engagement with the other spool.

19. In a typewriting machine, the combination of a carriage, type carriers, a type guide therefor, and a ribbon guide that moves in an inclined plane and is guided by the type guide.

20. In a typewriting machine, the combination of a carriage, a platen, an escapement, a rock shaft mounted to turn in fixed bearings, a lever extending rearwardly therefrom, the link connecting the lever with the escapement, a ribbon guide, and connections between the rock shaft and the ribbon guide, substantially as described.

21. In a typewriting machine, the combination of a carriage, a platen which is adapted to move transversely in an inclined plane for changing the case position thereof, type carriers, finger keys for actuating said type carriers, a movable ribbon guide, means for guiding said ribbon guide so that it will move in an inclined plane, and means for automatically moving said guide at each operation of a finger key, to interpose the ribbon carried thereby in the path of a type on a type carrier in its approach to the printing point.

22. In a typewriting machine, the combination of a carriage, escapement mechanism therefor, a spring drum for said carriage, ribbon spools operatively connected to the spring drum to be rotated thereby, a rock shaft, intermediate connections between the ribbon vibrator and rock shaft and between the rock shaft and the escapement mechanism, a universal bar, and connections between said universal bar and rock shaft.

23. In a typewriting machine, the combination of a universal bar, a rock shaft actuated by said universal bar, a crank arm on said rock shaft, a ribbon vibrator mounted to slide on a fixed portion of the machine, and intermediate link connections between said crank arm and the sliding vibrator.

24. In a typewriting machine, the combination of a carriage, escapement devices therefor, a universal bar, a rock shaft actuated by said universal bar, a crank arm on said rock shaft, a ribbon vibrator, intermediate link connections between said crank arm and vibrator, and intermediate connections between said escapement devices and rock shaft.

25. In a typewriting machine, the combination of type bars, key levers therefor, a type guide, a ribbon vibrator, lugs on said guide for supporting the ribbon vibrator, a rock shaft, means for connecting said ribbon vibrator to the rock shaft, and means controlled by the key levers for rocking said rock shaft.

26. In a typewriting machine, the combination of a carriage, a platen, a series of type bars, means for effecting a relative shift between the platen and type bars in an inclined plane to change the case position, finger keys moving said type bars, a movable ribbon guide, means for guiding said ribbon guide so that it will move in an inclined plane coincident with or parallel to the plane of the relative movement between the platen and type bars, and means for automatically moving said ribbon guide at each operation of a finger key, to interpose the ribbon in the path of a type on a type bar in its approach to the printing point.

27. In a typewriting machine, the combination of a carriage, a platen, a series of type bars, means for effecting a relative shift between the platen and type bars in an inclined plane to change the case position, finger keys for moving said type bars, a ribbon vibrator, means for guiding said vibrator so that it will move in an inclined plane co-incident with or parallel to the plane of the shift, and means for automatically moving said ribbon vibrator at an operation of a finger key, to interpose the ribbon in the path of a type on a type bar in its approach to the printing point, said moving means comprising a universal bar, a rock shaft to which motion is communicated from said universal bar, and a connection between said rock shaft and vibrator.

28. In a typewriting machine, the combination of a carriage, a platen, a series of type bars, means for effecting a relative shift between the platen and type bars in an inclined plane to change the case position, finger keys moving said type bars, a ribbon vibrator, means for guiding said vibrator so that it will move in an inclined plane co-incident with or parallel to the plane of the shift, and means for automatically moving said ribbon vibrator at an operation of a finger key, to interpose the ribbon in the path of the type on a type bar in its approach to the printing point, said moving means comprising a universal bar, a rock shaft, a crank arm on said rock shaft, a link connection between said crank arm and the universal bar, another crank arm on said rock shaft, a lever connected to said ribbon vibrator, and a link connection between said last-mentioned crank arm and said lever.

29. In a typewriting machine, the combination of a rock shaft, a universal bar, crank arms on said rock shaft, supporting links between said crank arms and said universal bar, another crank arm on said rock shaft, a ribbon vibrator, and connections between said last mentioned crank arm and said ribbon vibrator.

30. In a typewriting machine, the combination of a rock shaft, a universal bar, crank arms on said rock shaft, supporting

links between said crank arms and said universal bar, another crank arm on said rock shaft, a ribbon vibrator, and intermediate connections between said last mentioned crank arm and said ribbon vibrator, said connections comprising a lever connected to the vibrator, and a link pivoted at one end to said crank arm and at the other end to said lever.

Signed at the borough of Manhattan, city 10 of New York, in the county of New York, and State of New York, this 22nd day of December, A. D. 1903.

GEORGE H. SMITH.

Witnesses:

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