H. H. STEELE.

TYPE WRITING MACHINE.

APPLICATION FILED DEC. 6, 1908.

981,808.

Patented Jan. 17, 1911.

3 SHEETS—SHEET 1.

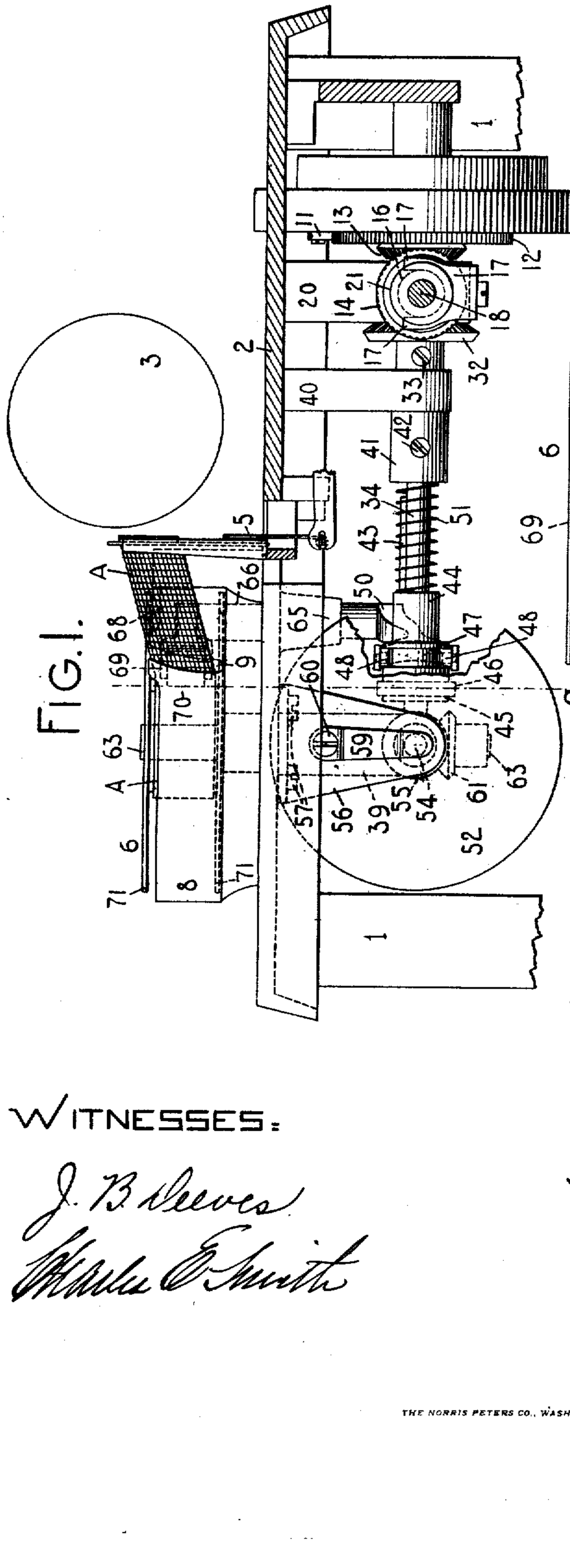

FIG. 1.

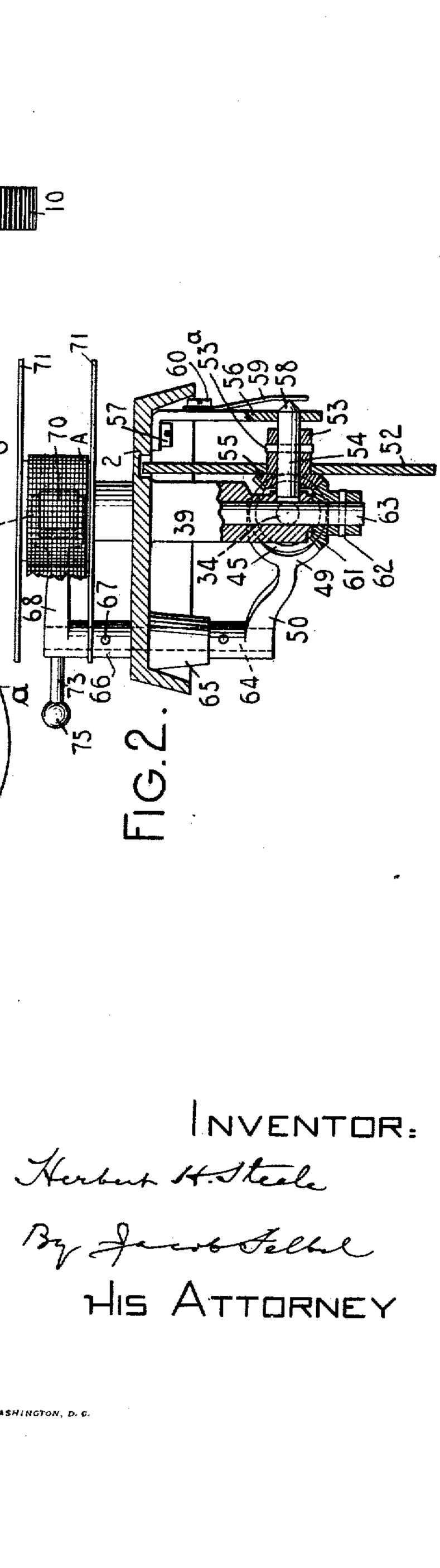

FIG. 2.

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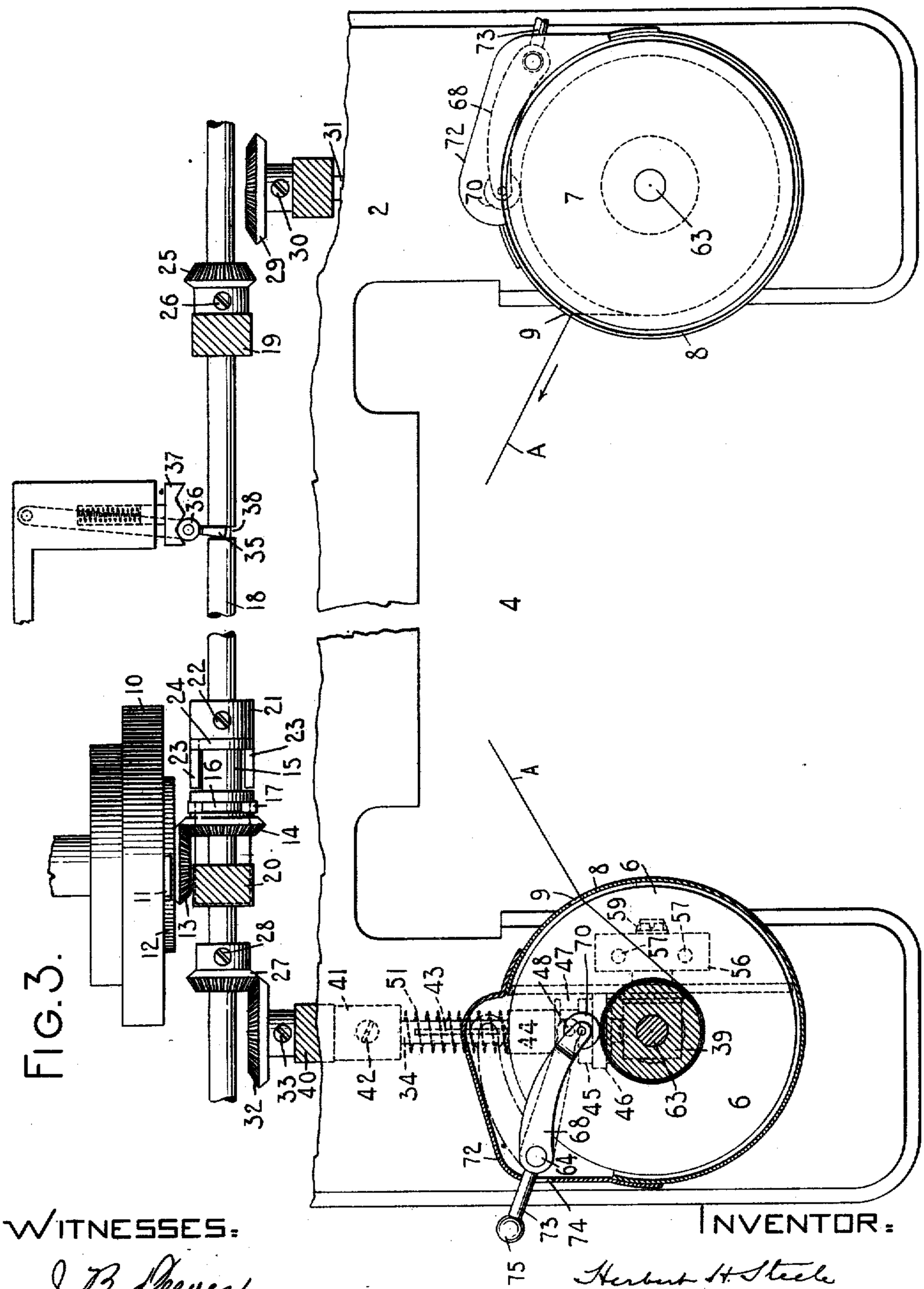


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3 SHEETS—SHEET 3.

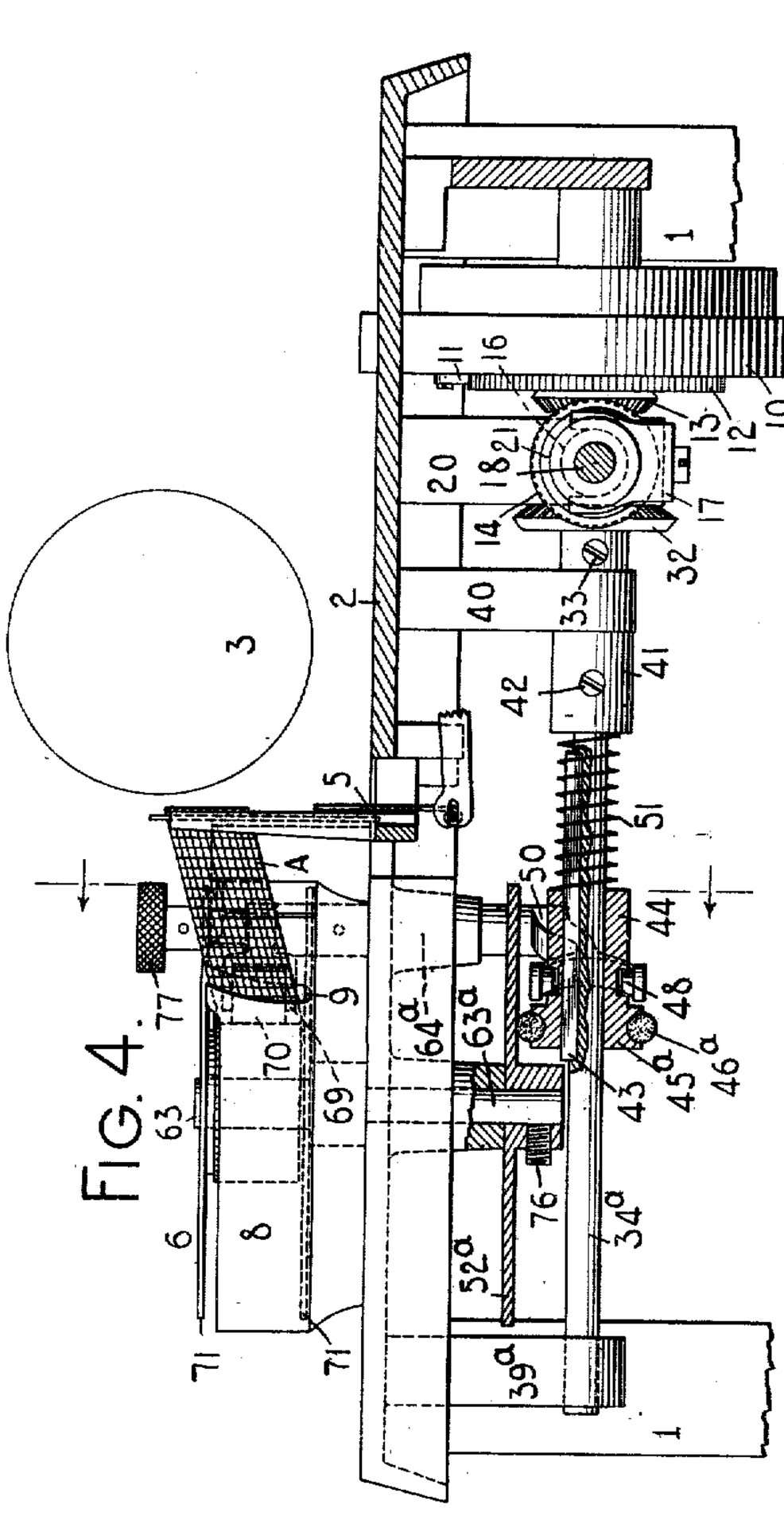

FIG. 4.

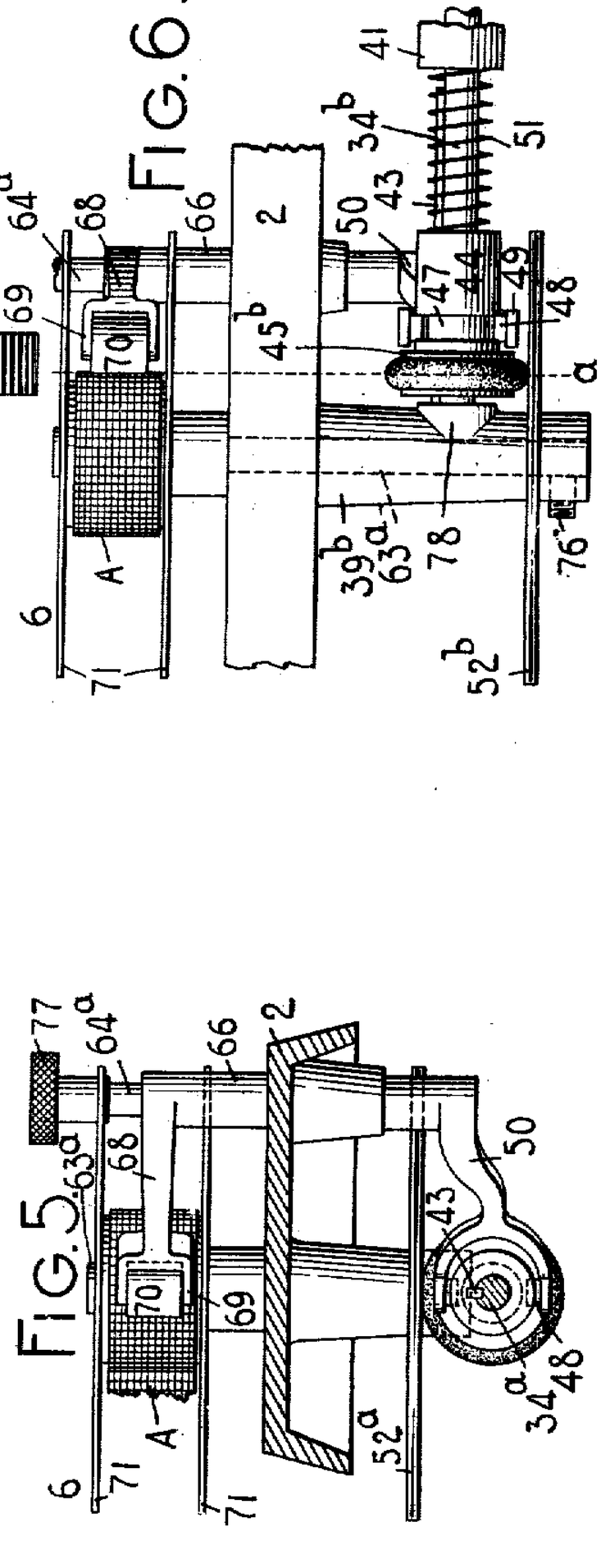

FIG. 6.



FIG. 5.

WITNESSES:

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# UNITED STATES PATENT OFFICE.

HERBERT H. STEELE, OF MARCELLUS, NEW YORK, ASSIGNOR TO THE MONARCH TYPE-WRITER COMPANY, OF SYRACUSE, NEW YORK, A CORPORATION OF NEW YORK.

## TYPE-WRITING MACHINE.

981,808. Specification of Letters Patent. **Patented Jan. 17, 1911.**

Application filed December 5, 1908. Serial No. 466,124.

*To all whom it may concern:*

Be it known that I, HERBERT H. STEELE, citizen of the United States, and resident of Marcellus, in the county of Onondaga 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 feed mechanism for such machines.

Heretofore it has been customary to rotate the winding or driven ribbon spool at a uniform rate, the velocity of the winding spool being constant relative to the travel of the carriage in the direction of its feed. Otherwise expressed, the driven spool has been given a uniform extent of rotation at each intermittent feed movement of the carriage. In such a construction, when the ribbon is being wound onto an empty or nearly empty spool, the longitudinal feed of the ribbon is comparatively slow; and as the amount of ribbon wound on the spool increases the velocity of the ribbon through the printing field gradually increases in proportion to the increasing diameter of the winding on the core. This causes an irregular longitudinal feed of the ribbon past the printing field; a feed that is comparatively slow or short at the start and gradually increases as the opposite end of the ribbon is approached. When the ribbon begins to feed on the empty spool in certain machines on the market the types make approximately one hundred impressions for each linear inch of travel. When the winding spool is full, and the direction of the feed about to be changed, the types make approximately forty-seven impressions to every linear inch of feed. In other words, the ribbon at the end of the stretch is fed more than twice as fast relatively to the feed of the carriage and twice as far at each intermittent feed movement as it is at the start where it begins to wind on the empty spool.

One of the main objects of my present invention is to overcome the above difficulties and to provide means whereby the velocity and extent of rotation of the winding spool varies progressively according to the amount of ribbon wound on said spool, for effecting uniform travel of the ribbon past the printing field.

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 in which like reference characters designate corresponding parts in the various views, Figure 1 is a fragmentary central vertical fore and aft sectional view showing the upper portion of one form of typewriting machine embodying my invention. Fig. 2 is a fragmentary front view, partly in vertical section, of a portion of the ribbon mechanism shown in Fig. 1. Fig. 3 is a fragmentary plan view with parts in section of the ribbon feed mechanism. Fig. 4 is a view corresponding to Fig. 1 but showing a modified form of construction embodying my invention. Fig. 5 is a rear view in vertical section showing the modified form of construction illustrated in Fig. 4. Fig. 6 is a fragmentary side view showing parts of a ribbon feed mechanism of still another modified form of construction embodying the invention.

I have shown my invention in the present instance embodied in a Monarch machine, although it should be understood that the invention is applicable to other styles of typewriting machines.

Referring particularly to Figs. 1, 2 and 3, the corner posts 1 of the machine support a top plate 2 on which a suitable carriage (not shown) is mounted to travel from side to side of the machine, the carriage supporting a cylindrical platen 3. Type bars of the usual form are adapted to strike upwardly and rearwardly through an opening 4 in the top plate against the front face of the platen 3, the ribbon A being automatically interposed in the path of the type by the usual mechanism for actuating a ribbon vibrator 5. The ribbon A passes through guide openings in the ribbon vibrator from one ribbon spool 6 to the opposite ribbon spool 7. The ribbon spools are received in cups or containers 8 provided with guide openings 9 through which the ribbon passes. The carriage is connected in the usual manner to a spring drum 10 provided with a pawl 11 pivoted thereto and engaging a ratchet wheel 12 connected with a beveled gear 13 which in turn meshes with a companion beveled gear 14 provided with a collar or sleeve

15 having a circumferential groove 16 therein. A fixed fork 17 engages in the groove 16 in the collar to maintain an engagement between the beveled gears 12 and 14 at all times. The beveled gear 14 and its sleeve 15 are loosely mounted upon a shaft 18 journaled in depending bracket arms 19 and 20 for both rotary and longitudinal movement. A sleeve or collar 21 is secured to the shaft 18 by a screw 22. This sleeve 21 is provided with arms 23 that extend longitudinally of the shaft on opposite sides thereof and are received in openings or cut-outs formed in a circumferential flange 24 on the sleeve 15 of the beveled gear 14. By this construction a rotative connection is at all times maintained between the shaft 18 and the beveled gear 14, although the shaft is adapted to receive a longitudinal movement independently of the gear 14. The shaft 18 also carries a beveled gear 25 which has its hub secured to the shaft by a screw 26. A like beveled gear 27 is secured to the shaft near the opposite end thereof by a screw 28. A beveled gear 29 is secured by a screw 30 to the rear end of a horizontally disposed shaft 31 and at the opposite side of the machine there is another beveled gear 32 connected by a screw 33 to the rear end of a horizontal shaft 34. It will be understood that the longitudinal movement of the shaft 18, effected either through the usual hand actuated crank at one end thereof or through the usual means employed in the Monarch machine for instance for automatically effecting a longitudinal movement of the shaft, brings about the disengagement between the beveled gears 27 and 32 at one side of the machine and the engagement of the beveled gears 25 and 29 at the other side of the machine, or vice versa, depending on the direction of longitudinal movement of the shaft 18. A pivoted arm 35 carries an anti-friction roller 36 that coöperates with the usual spring-pressed cam device 37 to assure the full extent of longitudinal movement of the shaft 18 in either direction and to effect and maintain an engagement between the gears 27 and 32 or 25 and 29, it being understood that the pivoted arm 35 is received in a cut-out or circumferential groove 38 in the shaft 18 and partakes of the movement of the shaft as the latter receives a longitudinal shifting movement. The shaft 34 is mounted in bearings in depending projections 39 and 40 supported by the top plate of the machine. The hub of the gear 32 coöperates with the projection 40 to prevent a longitudinal movement of the shaft 34 in one direction, whereas the movement of said shaft in the opposite direction is prevented by a collar 41 secured to the shaft by a screw 42. The shaft 34 is provided with a spline 43 which is received in a spline groove of a sleeve 44. This sleeve carries a wheel 45 at one end thereof which has a groove in which a tire, contact or periphery 46 of rubber or like material may be seated. The member 44 also has a circumferential groove 47 therein, said groove receiving inwardly extending pins 48 of a yoke-like piece 49 carried by an arm 50 supported and controlled in a manner which will hereinafter appear. A coiled expansion spring 51 surrounds the shaft 34 and bears at its rear end against the sleeve 41 and at its forward end against the rear end of the member 44 in order to force the member 44 forwardly along the shaft 34. The splined connection between the member 44 and the shaft 34 causes the member 44 to rotate with the shaft, but leaves said member free to receive an independent movement along the shaft. From an inspection of Fig. 1 it will be seen that the movement of the member 44 along the shaft 34 carries it nearer to or farther from the axis of a friction disk 52 which is disposed in a vertical plane. This friction disk is fixed in any suitable manner to a collar 53 mounted upon and fixed to a shaft or spindle 54 by a pin $53^a$, the sleeve 53 forming the hub of a beveled gear 55. One end of the shaft 54 is received in a bearing opening in a depending bracket arm 56 secured to the top plate of the machine by screws 57. The opposite end of the shaft is received in a bearing opening in the depending projection 39. The inner end of the shaft 54 extends beyond the bracket 56 and is formed with a conical end 58 against which a leaf spring 59 bears, the spring being secured to the bracket by a screw 60. The pressure of this spring is exerted to move the shaft 54 longitudinally in its bearings toward the depending projection 39 and is effective to constantly exert a pressure of the disk 52 against its coöperating frictional driving wheel 45 and to automatically compensate for any wear that may take place on the tread of the wheel 45.

The beveled gear 55 meshes with a companion gear 61 secured by a pin 62 to an upright ribbon spool shaft 63 which is received in a bearing opening in the depending projection 39 and extends through the top plate and carries at its upper end the left-hand ribbon spool 6. The spring 59 also serves to maintain the pinion 55 in mesh with the pinion 61. The arrangement of the parts is such that the rubber tread of the wheel 45 bears against the friction disk and as the shaft 34 rotates, motion is transmitted through the wheel 45 to the friction disk 52 and from the friction disk to the ribbon spool through the gears 55 and 61 and shaft 63.

The arm 50 hereinbefore referred to is secured to the lower end of a vertically disposed rock shaft 64 received in a bearing 65

and extending through the top plate adjacent to the ribbon spool 6 and just outside of the periphery thereof as shown in Fig. 3. A sleeve 66 is secured to the upper end of the shaft by a pin 67 and carries an arm 68 forked at its end as indicated at 69 for the reception of a roller 70 pivoted between the arms of the fork. The arm and roller are adapted to pass between the flanges 71 of the ribbon spool and to be pressed against the outer surface of the ribbon wound thereon by the spring 51 acting on the member 44. From an inspection of Fig. 3 it will be seen that the casing 8 for the ribbon spool is enlarged at 72 to receive the arm 68 when the latter is moved to the dotted line position shown in said figure where it is free of the ribbon spool and at this time does not interfere with the removal of the ribbon spool from its shaft and from the casing. The sleeve 66 is likewise provided with a crank arm 73 which extends through an opening 74 in the enlargement 72 of the casing and is provided with a finger piece 75 at the outer end thereof in order that the rock shaft may be turned by hand to move the arm 68 to the position shown in dotted lines in Fig. 3 to clear it of the ribbon spool so that the latter may be removed from the machine.

From the foregoing description it will be understood that the spring 51 tends to force the member 44 forwardly along the shaft 34 toward the axis of rotation of the friction disk 52 and that the position of the wheel 45 relatively to the axis of rotation of the disk is controlled by the swinging arm 68 through the engagement of the roller or contact piece 70 bearing on the surface of the ribbon on the spool. From an inspection of Fig. 1 it will be seen that the dotted line *a* extends through the roller 45 and through the outermost layer of ribbon wound upon the spool 6. This relation is maintained at all times. Thus it will be understood that if there are but few windings of the ribbon upon the spool 6, the wheel 45 will be near the center of the friction disk 52 and as the spool is rotated and the diameter of the coil of ribbon on the spool increases the contact device 70 will be forced outwardly from the axis of the ribbon spool and will effect a movement of the wheel 45 to a corresponding distance from the axis of the friction disk 52 through the intermediate swinging arm 68, rock shaft 64, arm 50 and yoke member 49. It will be seen therefore that the smaller the winding of the ribbon on the spool the higher will be the velocity of the spool effected through the ratio-changing gears 45 and 52 by reason of the fact that at this time the wheel 45 is nearer the center of revolution of the disk 52. As the ribbon is taken up and wound upon the spool 6 the wheel 45 is gradually moved rearwardly along the shaft 34 through the intermediate mechanism between the member 44 and the contact device or roller 70 and the velocity transmitted to the ribbon spool through the ratio-changing gearing gradually decreases as the wheel 45 approaches the periphery of its coöperating friction disk 52 so that the velocity of the spool is dependent upon the diameter of the core of the spool on which the ribbon is being wound together with the ribbon wound upon the core and the ribbon will be fed past the printing field at a uniform speed; that is to say, at each printing movement or at each letter space feed movement of the carriage the ribbon will be fed a uniform distance irrespective of the amount of ribbon which is wound upon the winding spool.

I have described the construction and arrangement of the parts between the beveled gear 32 and the left-hand ribbon spool. It should be understood that the parts intermediate the right-hand ribbon spool and the beveled gear 29 correspond with those at the left-hand side of the machine and a detail description thereof is deemed unnecessary. The same reference numerals are employed to designate the corresponding parts on both sides of the machine.

In Figs. 4 and 5 I have shown a modified form of construction embodying my invention. In these figures the parts which are the same as those in the preceding figures will be indicated by the same reference numerals. In this modified construction the friction disk 52ª is horizontally disposed instead of being vertically disposed as in the construction previously described, and is directly connected to the upright ribbon spool shaft 63ª by a set screw 76 so that a relative adjustment may be effected between the disk and the tread or periphery 46ª of the wheel 45ª. In this modified construction, therefore, it will be seen that the friction disk is directly connected to the ribbon spool shaft 63ª instead of being connected thereto through intermediate beveled gears as in the previously described construction. Moreover the shaft 34ª is projected forwardly beyond the ribbon spool shaft 63ª and receives a bearing in a depending lug 39ª which projects from the top plate of the machine. Moreover the upright rock shaft 64ª extends through the casing 8 at its upper end where it is provided with a knurled head 77 by which the shaft may be turned in order to remove the arm 68 from between the flanges of the ribbon spool instead of the crank arm being provided on the rock shaft as in the construction hereinbefore described. Otherwise the construction is essentially the same as that previously described.

In Fig. 6 a still further modification is shown in which a bearing 78 is formed in the depending projection 39ᵇ in which the

upright ribbon spool shaft turns and the forward end of the shaft $34^b$ is received in the bearing 78. The wheel $45^b$ in this instance bears on top of the horizontally disposed disk $52^b$ instead of on the under surface thereof as shown in Figs. 4 and 5, otherwise the construction is essentially the same as that shown in Figs. 4 and 5 and the same reference numerals will be employed to designate the parts which correspond to those shown in the preceding figures.

The operation of the construction will be understood from the foregoing description. Briefly stated, as the ribbon A passes from the right-hand ribbon spool to the left-hand spool the ribbon on the core of the left-hand ribbon spool 6 will increase so as to increase the diameter of the coil of ribbon. As this increase in the diameter of the coil is effected the swinging arm 68 will be moved from the full line toward the dotted line position shown in Fig. 3, thus gradually moving the wheel 45, toward the periphery of the other member 52 of the ratio-changing friction gearing, thus gradually and progressively decreasing the rate of revolution of the winding spool 6 as the ribbon is wound thereon. The members 45 and 52 constitute also leverage changing devices connected with the spool driving mechanism since the leverage on the spool changes in accordance with the position of the wheel 45 on the disk 52, the leverage being greatest when the wheel 45 is near the periphery of the disk and least when it is near the axis of the disk. The speed or rate of the rotation of the spool changes in accordance with this leverage. During the movement of the ribbon in the opposite direction when the shaft 18 is moved longitudinally to effect an engagement between the gears 25 and 29 the spool 7 becomes the winding spool and the associated parts control the ratio-changing gear of that spool in the same manner, so that the speed of revolution of the driven spool relative to the carriage, whether it be the right-hand or left-hand spool, is automatically controlled to effect a uniform intermittent feed of the ribbon past the printing field.

The ribbon feed mechanism of my present invention is particularly well adapted for feeding an ink "ribbon" of paper having the "ink", carbon, or pigment on the side next to the platen and being uninked or plain on the opposite side thereof.

Various changes may be made without departing from the spirit and scope of my invention.

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

1. In a typewriting machine, the combination of a pair of ribbon spools, and means for turning one or the other of said spools intermittently during the printing operations and thereby feed the ribbon first in one direction and then in the other as may be desired; said means including means for changing the leverage of the turning means upon each of said spools, so as to turn the driven spool at different rates of speed as the ribbon is wound thereon, whereby a uniform extent of feed of the ribbon is effected at each intermittent movement of the ribbon spool irrespective of the amount of ribbon wound on the spool.

2. In a typewriting machine, the combination of power driven means for moving the carriage, a pair of ribbon spools, and means controlled by the power employed to move the carriage for effecting a turning movement of either one or the other of the ribbon spools as may be desired at each printing operation to feed the ribbon past the printing point in either one direction or the other, said means including means whereby progressively shorter intermittent winding movements are transmitted to the driven spool during printing operations as the ribbon continues to be wound thereon, to cause the ribbon to be drawn off one spool and to be wound on the other or driven spool.

3. In a typewriting machine, the combination of a pair of ribbon spools, intermittently actuated driving means for said spools, and means whereby either spool may become the driven spool, said driving means including leverage changing devices for driving either one or the other of said spools at different rates of speed as the ribbon is wound thereon; whereby a uniform extent of longitudinal feed of the ribbon is effected at each intermittent movement irrespective of the amount of ribbon on the driven spool and irrespective of which spool is the driven spool.

4. In a typewriting machine, the combination of a pair of ribbon spools, driving means for said spools and by which the ribbon is drawn off one spool and is wound on to the other or driven spool, and means whereby either spool may be made the driven spool, said driving means including changeable gearing and automatically actuated means for changing the ratio of said gearing to change the rate of speed of the driven spool in accordance with the amount of ribbon wound thereon.

5. In a typewriting machine, the combination of ribbon spools; driving mechanism therefor and by the driving of which the ribbon is drawn from one spool and is wound on the other or driven spool, said driving mechanism including changeable gearing; and means controlled by the amount of ribbon on the spool for determining the relation between certain of the members of said gearing to vary the ratio thereof.

6. In a typewriting machine, the combi-

nation of ribbon spools; driving mechanism therefor and by the driving of which the ribbon is drawn from one spool and is wound on the other or driven spool, said driving mechanism including changeable gearing; controlling means controlled by the amount of ribbon on the driven spool for determining the relation between certain of the members of said gearing and thus automatically changing the rate of speed of said ribbon spool; and hand actuated means for said controlling means.

7. In a typewriting machine, the combination of ribbon spools; means for intermittently rotating one or the other of said ribbon spools and thereby drawing the ribbon off one spool and on to the other or driven spool; and means, which include a contact device that bears on the ribbon on the spool, for automatically varying the rotative steps of the driven spool in accordance with the amount of ribbon wound thereon.

8. In a typewriting machine, the combination of ribbon spools; driving mechanism therefor and by the driving of which the ribbon is drawn from one spool and is wound on the other or driven spool, said driving mechanism including changeable gearing; and means, including a contact device which bears on the ribbon on the driven spool, for automatically varying the relation between members of the changeable gearing as the ribbon is wound on the driven spool.

9. In a typewriting machine, the combination of ribbon spools; means controlled by the feed movement of the carriage for driving either one or the other of said ribbon spools as may be desired, said means including changeable gearing; and automatically actuated means for changing said changeable gearing to vary the ratio thereof and to vary the turning or feed movement of the driven spool.

10. In a typewriting machine, the combination of ribbon spools; means controlled by the feed movement of the carriage for driving either one or the other of said ribbon spools as may be desired, said means including changeable gearing; and automatically actuated means for changing said changeable gearing to vary the ratio thereof and to vary the turning or feed movement of the driven spool, said automatically actuated changing means including a contact device which bears on the surface of the ribbon on the driven spool and whose position is altered in accordance with the amount of ribbon on the driven spool.

11. In a typewriting machine, the combination of a spring drum for the carriage; ribbon spools; intermediate driving connections between the spring drum and the ribbon spools for driving either one or the other of said spools as may be desired, said intermediate connections including variable feed actuating devices; and automatically actuated means for varying the actuating devices to vary the rotative feed of the driven ribbon spool.

12. In a typewriting machine, the combination of ribbon spools; means for intermittently rotating either one or the other of said ribbon spools as may be desired at each printing operation; means, which include a contact device that bears on the ribbon on the driven spool, for varying the extent of the different intermittent rotations of the spool in accordance with the amount of ribbon wound thereon, the ribbon as it is wound on the driven spool forcing said contact device away from the axis of the spool; and a spring for forcing said contact device toward the axis of the spool.

13. In a typewriting machine, the combination of ribbon spools; driving mechanism therefor actuated at each letter space movement of the carriage to draw the ribbon from one spool and wind it on the other or driven spool, said driving mechanism including a driving disk and a coöperative driving wheel; and means for effecting a relative movement between the wheel and disk toward and from the axis of the disk to vary the feed of the driven spool.

14. In a typewriting machine, the combination of ribbon spools; driving mechanism therefor actuated at each letter space movement of the carriage to draw the ribbon from one spool and wind it on the other or driven spool, said driving mechanism including a driving disk and a coöperative driving wheel; and means for effecting a relative movement between the wheel and disk toward and from the axis of the disk to vary the feed of the ribbon spool, said last mentioned means including a contact device that bears on the ribbon on the driven spool.

15. In a typewriting machine, the combination of ribbon spools; driving mechanism therefor actuated at each letter space movement of the carriage to draw the ribbon from one spool and wind it on the other or driven spool, said driving mechanism including a driving disk and a coöperative driving wheel; means for effecting a relative movement between the wheel and disk toward and from the axis of the disk to vary the feed of the driven wheel, said last mentioned means including a contact device that bears on the ribbon on the driven spool; and hand actuated means for moving said contact device away from the ribbon.

16. In a typewriting machine, the combination of ribbon spools; driving mechanism therefor actuated at each letter space movement of the carriage to draw the ribbon from one spool and wind it on the other

or driven spool, said driving mechanism including a driving disk and a coöperative driving wheel; a contact device that bears on the ribbon on the driven spool; and intermediate connections between said contact device and said driving wheel.

17. In a typewriting machine, the combination of a ribbon spool; driving means for said spool: said driving means being actuated at each letter space movement of the carriage and including variable feed devices; a swinging device contacting with the ribbon on the spool; and intermediate connections between the swinging device and one of said variable feed devices, to automatically effect a change in the extent of feed effected by the driving means.

18. In a typewriting machine, the combination of a ribbon spool; driving means for said spool, said driving means being actuated at each letter space movement of the carriage and including variable feed devices; a swinging device contacting with the ribbon on the spool; intermediate connections between the swinging device and one of said variable feed devices to automatically effect a change in the extent of feed effected by the driving means; and hand actuated means connected with said swinging device to throw it out of coöperation with the ribbon.

19. In a typewriting machine, the combination of a pair of ribbon spools; driving means therefor; and means whereby the spools may be alternately driven to wind the ribbon thereon, said driving means including leverage changing means for the spool whereby each spool as it becomes the driven spool will be automatically fed at a varying rate in accordance with the amount of ribbon wound thereon and thereby draw the ribbon from one spool and on to the other or driven spool.

20. In a typewriting machine, the combination of a pair of ribbon spools; driving means therefor; means whereby one of said spools is disconnected from its driving means when the other spool is connected therewith, said driving means including leverage changing means for the spool for varying the rate of turning of the spool in accordance with the amount of ribbon wound on that spool which is connected to its driving means.

21. In a typewriting machine, the combination of a pair of ribbon spools; driving means therefor; means whereby one of said spools is disconnected from its driving means when the other spool is connected therewith, said driving means including variable feed devices; and means for automatically changing the relations of said variable feed devices.

22. In a typewriting machine, the combination of a pair of ribbon spools; driving means therefor; means whereby one of said spools is disconnected from its driving means when the other spool is connected therewith, said driving means including variable feed devices for each ribbon spool; and independent means coöperative with the ribbon on each spool for controlling the relation of the associated variable feed devices.

23. In a typewriting machine, the combination of a ribbon spool; feed mechanism therefor actuated at each letter space movement of the carriage and including automatically variable feed devices; and means for automatically taking up wear between said automatically variable feed devices.

24. In a ribbon mechanism for typewriting machines, the combination of a rotary actuating device actuated by the power employed to move the carriage, a coöperating rotary actuating device which turns on an axis at right angles to the axis of rotation of said first mentioned rotary actuating device, and means for automatically varying the distance from the center of rotation of said rotary actuating device at which it cooperates with said coöperating actuating device.

25. In a ribbon mechanism for typewriting machines, the combination of two cooperating rotary actuating devices, one of which is actuated at each letter space movement of the carriage to feed the ribbon, and means operating automatically to vary the distance from the center of rotation of one of said devices at which it coöperatively engages with the other of said devices.

26. In a typewriting machine, the combination of ribbon spools; means controlled by the feed movement of the carriage for driving one or the other of the ribbon spools as may be desired, said means including changeable gearing; and automatically actuated means for changing said gearing to vary the ratio thereof and to vary the turning or feed movement of the driven spool.

27. In a typewriting machine, the combination of ribbon spools; means controlled by the feed movement of the carriage for driving one or the other of the ribbon spools as may be desired and to draw the ribbon from one spool to the other or driven spool, said means including changeable gearing; and automatically actuated means for changing said gearing to vary the ratio thereof and to vary the turning or feed movement of the driven spool, said automatically actuated changing means including a contact device which bears on the surface of the ribbon on the driven spool and whose position is altered in accordance with the amount of ribbon on the spool.

28. In a typewriting machine, the combination of ribbon spools and driving mechanism therefor operative at will on one or

the other of said spools, said driving mechanism including devices for turning the driven spool at different rates of speed as the ribbon is wound thereon, the feed of the ribbon being uniform at each printing stroke and dependent wholly on the changeable rate of speed of the driven spool.

Signed at Syracuse, in the county of Onondaga and State of New York this 3rd day of December A. D. 1908.

HERBERT H. STEELE.

Witnesses:

GEORGE L. COLING,

BESSIE G. KETTELL.