O. C. KAVLE.

RIBBON MECHANISM FOR TYPE WRITING MACHINES.

APPLICATION FILED JULY 1, 1907.

**944,734.**

Patented Dec. 28, 1909.

3 SHEETS—SHEET 1.

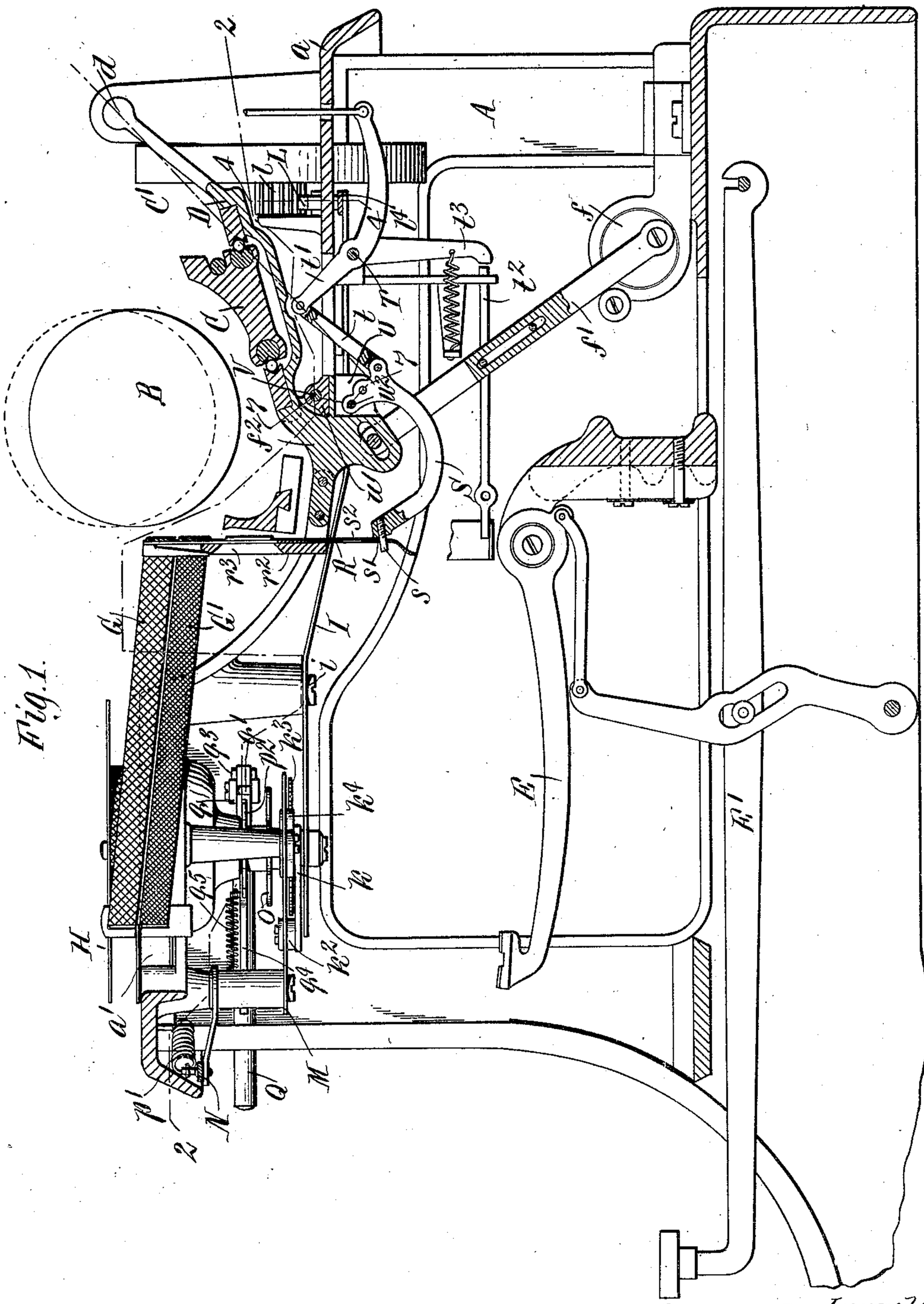

Fig. 1.

Witnesses:
E. A. Volk.
A. G. Dimond.

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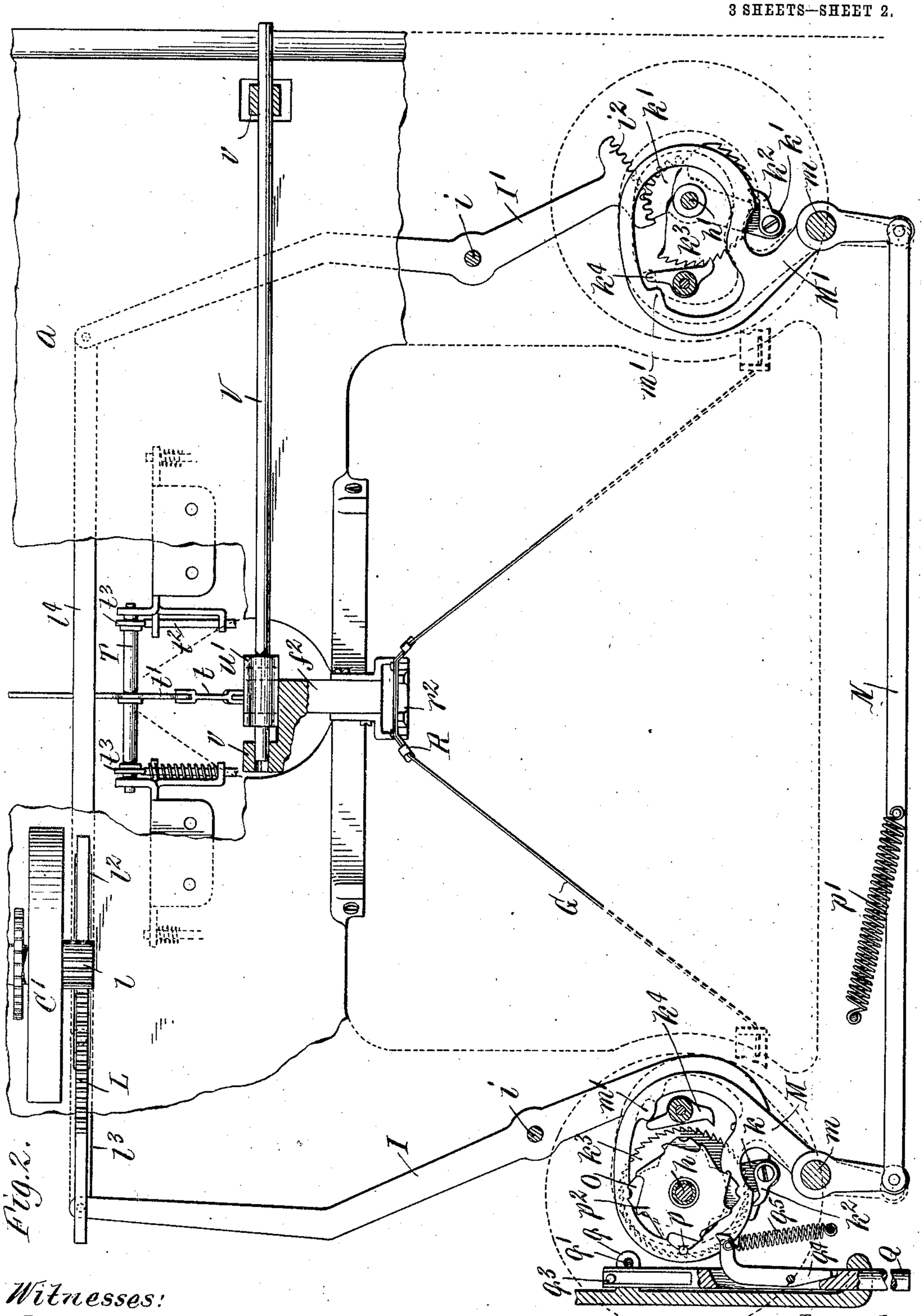

Fig. 2.

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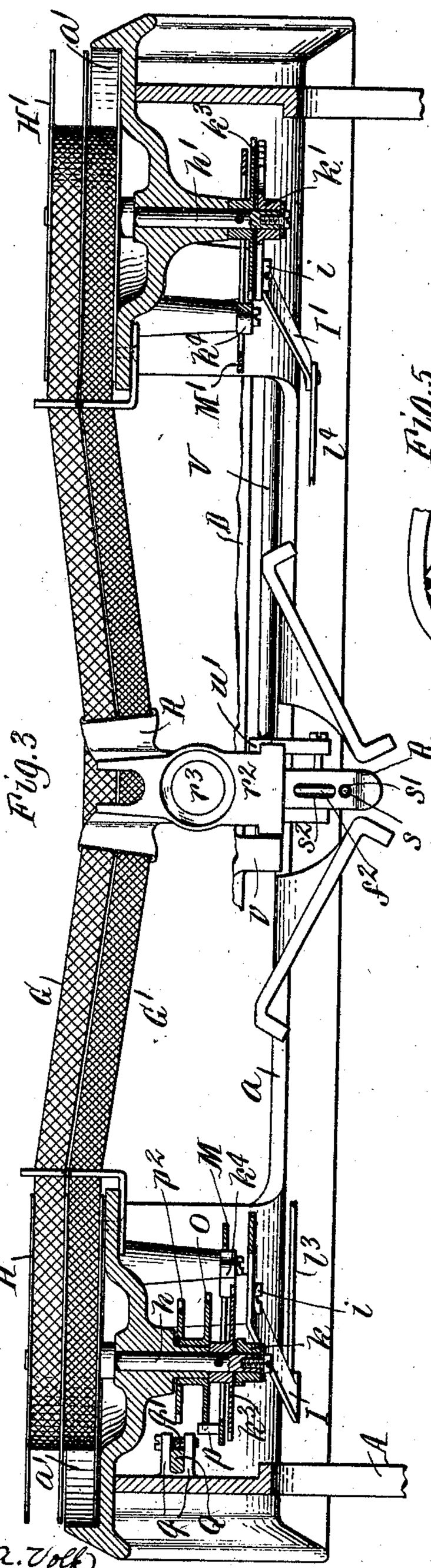

Fig. 3

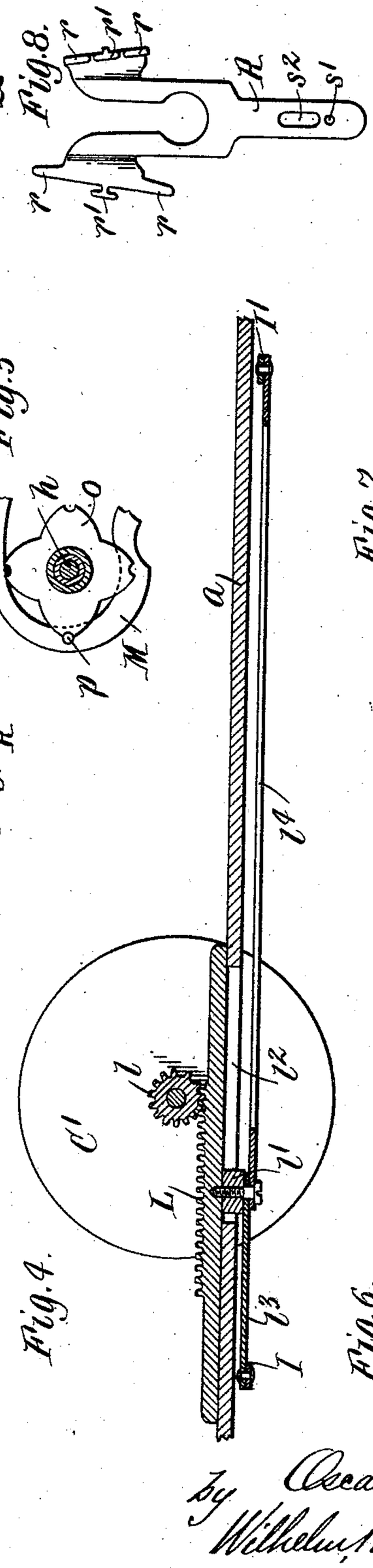

Fig. 8.



Fig. 5



Fig. 4.

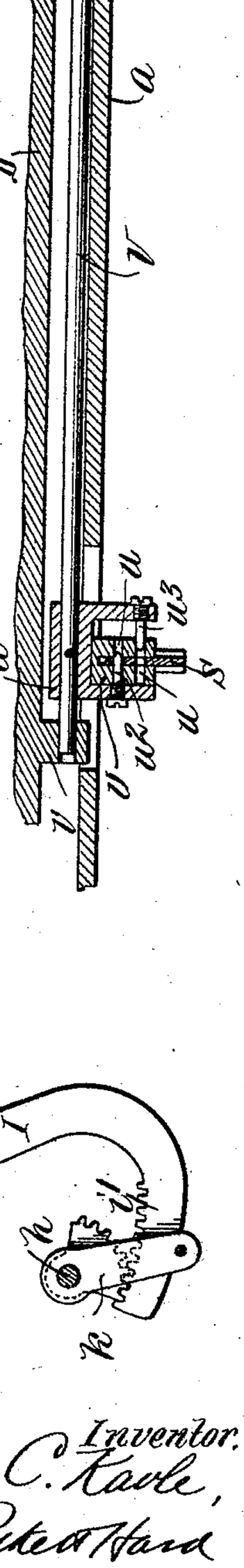

Fig. 7.



Fig. 6.

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# UNITED STATES PATENT OFFICE.

OSCAR C. KAVLE, OF SYRACUSE, NEW YORK, ASSIGNOR TO HARVEY A. MOYER, OF SYRACUSE, NEW YORK.

## RIBBON MECHANISM FOR TYPE-WRITING MACHINES.

944,734. Specification of Letters Patent. Patented Dec. 28, 1909.

Application filed July 1, 1907. Serial No. 381,762.

*To all whom it may concern:*

Be it known that I, OSCAR C. KAVLE, a citizen of the United States, residing at Syracuse, in the county of Onondaga and State of New York, have invented a new and useful Improvement in Ribbon Mechanisms for Type-Writing Machines, of which the following is a specification.

This invention relates more particularly to ribbon mechanisms for visible writing typewriting machines of the sort in which the ribbon is vibrated to and from the printing position opposite to the printing point on the platen, so as to expose the writing to view except when making the impressions.

The invention is directed especially to improvements in the mechanisms for feeding the ribbon lengthwise, reversing the direction of the feed thereof, and vibrating the ribbon, in a front-strike machine in which the impressions are made at the front side of the platen. Many features of the invention are, however, also applicable to other kinds of typewriting machines.

The objects of the invention are to provide simple, compact and direct acting driving means for winding the ribbon on its spools; also to provide easily operated and positively acting means of simple construction for reversing the feed of the ribbon; also to provide simple means for vibrating the ribbon, and for disconnecting it from its vibrating means so that it can remain idle out of printing position to adapt the machine for stencil cutting; also to provide a vibrator adapted to guide two ribbons and vibrate them together, and operating means therefor whereby the vibrator can be moved different distances from the same normal position as required to vibrate one or the other ribbon to and from the printing position; also to so construct the vibrating mechanism that it will produce like vibration of the ribbons in either position of the platen, in a machine in which the platen is shifted to different positions for printing upper and lower case characters; and also to improve ribbon mechanisms for typewriting machines in the respects hereinafter described and set forth in the claims.

In the accompanying drawings, consisting of three sheets: Figure 1 is a longitudinal sectional elevation of portions of a front strike typewriting machine provided with ribbon mechanism embodying the invention. Fig. 2 is a broken plan view thereof, partly in horizontal section, in line 2—2, Fig. 1. Fig. 3 is a transverse sectional elevation thereof. Fig. 4 is a transverse sectional elevation of the ribbon feed mechanism in line 4—4, Fig. 1. Fig. 5 is a plan view detached of the ribbon reversing cam wheel. Fig. 6 is a plan view, partly in section, of one end of one of the feed levers and the pawl lever operated thereby. Fig. 7 is a transverse sectional elevation of the ribbon vibrating mechanism in line 7—7, Fig. 1. Fig. 8 is a rear elevation of the partially formed vibrating ribbon guide.

Like letters of reference refer to like parts in the several figures.

A represents the main frame of the machine, the top plate *a* of which preferably has an elevated front portion provided at opposite sides with spool seats *a'* and with a central opening to allow the type-bars to strike the platen.

B represents the platen; C the platen carriage; C′ the usual spring drum or motor for driving the carriage; D the shift frame on which the carriage is supported and travels transversely of the machine; E one of the type-bars which are suitably pivoted to strike the front side of the platen; and E′ one of the key levers for operating the type-bars. The type-bars are provided with upper and lower case type, and the shift frame D is suitably pivoted at the upper rear portion of the main frame to swing up and down about an axis, indicated at *d*, Fig. 1, to place the platen in printing relation with either set of type on the type-bars. The shift frame is shifted and held in such positions by an oscillatory eccentric *f* and rod *f'* connected to the same and having a slotted or forked upper end connected to a front central extension $f^2$ of the shift frame. These parts constitute no part of the invention and are thus briefly described simply to aid in a proper understanding of the ribbon mechanism. They may be of the known construction shown or any other suitable construction.

G G′ represent two ink ribbons carrying inks differing in color or other characteristics. As shown, they are arranged edge to edge, one over the other, are connected at

opposite ends to a single pair of spools H H′ and pass one over the other through a guide or vibrator in front of or opposite to the printing point of the platen. The ribbons are wound on the spools and vibrated together in the same manner as a single ribbon would be. In fact, one wide ribbon having upper and lower bands of different kinds of ink would be operated in just the same manner, and for simplicity the feeding and reversing mechanisms will be described as though only one ribbon were used. The spools are located in the seats $a'$ in the top plate $a$ and are suitably secured to the upper ends of upright spool shafts $h$ $h'$ journaled in suitable bearings depending from the top plate.

The mechanism for driving the spools to feed the ribbon lengthwise and for reversing the feed is similar in principle to that disclosed in my application filed Sept. 4, 1906, Serial No. 333,216, but is preferably of the following improved construction:

I I′ represent two feed levers which are arranged horizontally beneath the top plate $a$ and are suitably fulcrumed between their ends, for instance, on pivots $i$ depending from the top plate. These feed levers are provided at their front ends with toothed segments $i'$ $i^2$, Figs. 2 and 6, which mesh with gears or gear teeth on pawl carriers $k$ $k'$ loosely journaled on the lower ends of the spool shafts $h$ $h'$, and carrying feed pawls $k^2$ pressed by hidden springs into engagement with ratchet wheels $k^3$ fixed to the spool shafts. The toothed segments $i'$ $i^2$ engage their pawl carriers respectively in front and in rear of the spool shafts $h$ $h'$, so that by rocking the feed levers in the same direction the pawl carriers and feed pawls will be oscillated in opposite directions.

$k^4$ represents holding dogs which are suitably pivoted to the top plate and are pressed by hidden springs toward the ratchet wheels to hold the wheels from backward rotation.

L, Figs. 2 and 4, represents a horizontal rack bar which meshes with a pinion $l$ secured to or driven by the carriage driving drum C′. The rack bar is attached to a slide $l'$ which is guided in a slot $l^2$ in the top plate and is connected to the rear ends of the feed levers $k$ $k'$ by links $l^3$ $l^4$ pivoted to said slide and to the levers. When the spring drum turns slowly in one direction in moving the carriage to the left under the control of its escapement, the feed levers are slowly rocked in one direction and advance the feed pawls, and when the carriage is set back and the driving drum turned in the reverse direction, the feed levers and pawls are returned. One of the pawls is held by its spring against its ratchet wheel to turn the same and the connected spool shaft and spool, but the other feed pawl is held out of engagement with its ratchet wheel by one of two like, but oppositely arranged reversing levers M M′, Figs. 1–3. Each of these levers is arranged horizontally above one of the ratchet wheels, being fulcrumed between its ends by a hub or sleeve on a pivot $m$ depending from the top plate, or in any other suitable manner. The reversing levers have loops surrounding the spool shafts, each loop having at one side a segmental circular edge for engaging the adjacent feed pawl, and at the opposite side a lug $m'$ for engaging the tail of the adjacent holding dog.

In the position of the reversing levers shown in Fig. 2, the circular edge of the lever M at the left engages the adjacent feed pawl $k^2$ and holds it away from its ratchet wheel, and the lug $m'$ on this lever also holds the dog $k^4$ away from the ratchet wheel, thus leaving this wheel free, while the right-hand reversing lever M′ permits both the adjacent feed pawl and dog to engage their ratchet wheel so that this wheel will be turned by the forward movements of the feed pawl. In this position of the reversing levers, therefore, the right-hand ratchet wheel and connected spool are turned to wind the ribbon on the spool, and the other ratchet wheel and connected spool are released so that the spool can turn freely as the ribbon is unwound therefrom.

To reverse the direction of feed of the ribbon the reversing levers are shifted to the position indicated by dotted lines in Fig. 2, when the feed pawl and dog for the right-hand ratchet wheel will be rendered inactive and those for the left-hand wheel will come into action. The mechanism for thus shifting the reversing levers to reverse the direction of feed of the ribbon is preferably constructed as follows, see especially Figs. 2, 3 and 5: The two reversing levers are connected to move together by a rod or bar N arranged horizontally transversely of the machine beneath the front edge of the top plate $a$ and connected to forwardly extending arms of the reversing levers.

O, Figs. 2, 3 and 5, represents a cam wheel which is mounted to revolve on the bearing for the left-hand spool shaft, and is provided with a series of salient peripheral portions or projections separated by intervening depressions and having seats or notches in their peaks. A stud or pin $p$ fixed to the adjacent reversing lever bears against the edge of the cam wheel. A suitable spring as $p'$, Fig. 2, attached to the connecting rod N and a pin depending from the top plate, tends to move said rod to the left and the looped ends of the reversing levers to the right, thus pressing the pin $p$ against the edge of the cam wheel O. A ratchet wheel $p^2$ is secured to the hub of the cam wheel and is provided with teeth equal in number to the number of the peripheral projections and depressions of the cam wheel, for in-

stance, the ratchet wheel shown has eight teeth and the cam wheel has four projections and four depressions.

Q, Figs. 1, 2 and 3, represents a push rod which is arranged horizontally to slide forwardly and rearwardly adjacent to the ratchet wheel. As shown, the push rod is guided at its front end in a hole in the main frame; and at its rear end between lugs $q$ extending from the side of the main frame and connected by a screw $q'$ which prevents displacement of the push rod. The rod is held from turning by flat upper and lower faces at its rear end bearing against the guide lugs. Shoulders at the inner ends of said flat faces and a pin $q^3$ in the end of the rod are adapted to strike the guide lugs to limit the rearward and forward movements of the push rod. A pawl or dog $q^4$ is pivoted between its ends in a slot in the push rod with its front end bearing against a shoulder on the push rod, and its laterally extending rear end arranged to engage the teeth of the ratchet wheel. The dog is held in this normal position and the push rod held in the forward position shown by a spring $q^5$ attached to the rear end of the pawl and to a pin or part on the top plate. When the push rod is shoved rearwardly the dog engages one of the teeth of the ratchet wheel, turning it and the connected cam wheel a part revolution. If the parts are in the position shown in Fig. 2 this will disengage the seat of one projection of the cam wheel from the pin $p$ on the reversing lever and the pin $p$ will be caused to slide inwardly on the edge of the cam wheel into the next depression of the cam wheel by the spring $p'$ attached to the connecting rod N, thus allowing the looped ends of the reversing levers to move to the right until arrested by the engagement of the pin in the bottom of the depression of the cam wheel. The spring $q^5$ attached to the reversing dog $q^3$ will retract the push rod when the pressure thereon is removed. At the next rearward movement of the push rod the dog will engage the next tooth of the ratchet wheel and turn it and the cam wheel another step, and the cam edge of the next projection of the cam wheel will engage the pin $p$ on the reversing lever and force the looped ends of the reversing levers to the left until the pin seats in the notch in the peak of the cam wheel projection. The reversing levers will be held stationary in either position by the engagement of the pin $p$ in a seat or depression of the cam wheel. Thus the reversing levers can be shifted from either position to the other, irrespective of the position they occupy, by a like, or rearward, movement of the push rod, so that to reverse the feed of the ribbon it is only necessary to shove the push rod rearwardly to its limit and this will always reverse the feed of the ribbon regardless of the direction in which the ribbon may be feeding. The ribbon can be reversed at any desired time. The reversing mechanism is easily operated, is positive in action and holds the reversing levers stationary in both of their positions.

The invention is not restricted to the particular construction and arrangement of the parts of the reversing mechanism above described, so long as the essential features of the cam wheel and means for turning it successive part revolutions by successive like movements of the same part are retained.

The construction and arrangement of the reversing levers and feed levers and their operating means could also be modified, for instance, as disclosed in my said application, without affecting the operation of the reversing mechanism, and the operation of the feed and reversing mechanism is not dependent upon the number or arrangement of the ribbons employed.

The ribbon vibrating mechanism is preferably constructed as follows: R represents the ribbon guide or vibrator which normally stands in the front of and below the printing point of the platen, and is mounted to vibrate up and down. The guide can be of any suitable construction, but is preferably made from sheet metal bent into the shape shown. In Fig. 8 the guide is shown as partially formed, the left-hand side showing the shape of the blank before bending. This blank is slotted at its upper portion to enable the type-bars to engage the ribbon, and is provided with lateral wings or portions each having at its upper and lower ends small extensions $r$, and centrally between these a T-shaped projection $r'$. The central projection $r'$ is bent to the rear and the upper and lower extensions $r$ are bent respectively downwardly and upwardly to the rear, as shown at the right-hand side of the guide in Fig. 8, thus providing two ribbon guide openings each with a central slot for the insertion and removal of the ribbon. In the machine illustrated the guide or vibrator slides vertically in suitable ways on the rear side of an upright support $r^2$ which is attached by rearwardly projecting feet to the front extension $f^2$ of the shift frame, see Figs. 1 and 2. The vibrator support is slotted at its upper end for the passage of the type to the platen and is provided with a central opening $r^3$ through which and the slot in the vibrator can be seen the scale bar, which is located in rear of the guide.

S represents a lever for vibrating the guide or vibrator. This lever is fulcrumed on the rear side of the shift frame extension $f^2$ and extends forwardly from its fulcrum, having at its front end a pin or stud $s$, Fig. 1, engaging in a hole $s'$ in the lower portion of the guide or vibrator. The guide or vi-

brator is preferably made of spring metal and its lower end is bent forwardly to form a finger piece. By springing the lower end forwardly and pulling the guide or vibrator downwardly, the stud of the vibrator lever can be disengaged from the hole $s'$ and engaged in a slot $s^2$ in the guide or vibrator, which is long enough to permit the vibrator lever to oscillate without vibrating the guide. Thus the guide or vibrator can be readily placed out of action with the ribbon below the printing point when it is desired to use the machine for stencil cutting. When it is desired to again place the vibrator in action, it is only necessary to shove the guide or vibrator upwardly in its support and engage the hole $s'$ in its lower end over the stud of the vibrator lever. This construction enables the vibrator to be readily placed either into or out of use without complicating the vibrating means with additional parts for this purpose.

The vibrator lever is preferably pivoted at its rear end to the lower end of the link $t$ which is pivoted at its upper end to an arm or lever $t'$ fixed to a rocking universal bar or shaft T arranged horizontally transversely of the machine in rear of the vibrator lever. This universal bar is rocked by one or more actuators $t^2$, Fig. 1, arranged to be struck by the type-bars as they approach the platen and to strike an arm or arms $t^3$ depending from the rock shaft T. The vibrator lever S moves up and down with the shift frame in shifting the platen, and the link is so arranged that a straight line passing through the pivotal axis of the shift frame, and the pivot connecting said link with the operating lever $t'$, will extend midway between the positions occupied by the link in the upper and lower positions of the shift frame, thus causing substantially like movements of the vibrator in both positions of the shift frame. This universal bar, which actuates the carriage escapement, forms the subject matter of my application, Serial No. 378,089, filed June 10, 1907, and is only shown herein and thus briefly described as one means for operating the ribbon guide or vibrator. Any other actuating means for this purpose could be employed.

The vibrator is operated to move from the same normal position below the printing point for vibrating the ribbons regardless of which ribbon is in use, and as one ribbon is located above the other, a shorter movement of the vibrator is required to vibrate the upper ribbon, which is the one more frequently used, than is necessary to vibrate the lower ribbon. These different movements of the guide or vibrator are accomplished without changing the normal position of the vibrator lever by shifting its fulcrum point relative to the operating link in the following manner: The fulcrum arm of the lever extends up into a slot in a rearwardly projecting lug U of the front extension of the shift frame, and is provided with two pivot holes which register with holes $u$ in the lug U at opposite sides of the lever, see Fig. 7.

$u'$ represents a yoke or slide which rests on and is adapted to slide laterally of the machine on the lug U. This yoke has depending legs at opposite sides of the fulcrum lug U, and fulcrum pins or pivots $u^2$ and $u^3$ extend inwardly from these legs into the holes in the lug. The engagement of the pivots in the holes in the lug holds the yoke steady on the lug. When the yoke is moved to the right, as shown in Figs. 2 and 7, the left-hand pivot $u^2$ extends through one fulcrum hole of the vibrator lever and bears in the lug at opposite sides of the lever, while the other pivot $u^3$ is withdrawn from its hole in the vibrator lever. The lever is then free to swing on the pivot $u^2$ as a fulcrum. By shoving the yoke to the left, the pivot $u^2$ is withdrawn from its hole in the lever, and the other pivot $u^3$ is engaged in its hole in the lever and bears at opposite sides of the lever in the lug U and the lever can then swing on this pivot as a fulcrum. In shifting the yoke one pin enters its hole in the lever before the other pivot is withdrawn from its hole, thereby preventing the displacement of the vibrator lever. Thus by shifting the yoke the lever, without being itself shifted or moved from its normal position, has its fulcrum point shifted farther from or nearer to the point of attachment of the operating link with the lever and thus the throw of the vibrator lever is shortened or lengthened accordingly.

In the normal operation of the machine, when the upper ribbon is used the vibrator lever swings on the pivot $u^2$, and when it is desired to use the lower ribbon the yoke is shifted and the vibrator lever swings on the other pivot $u^3$. As shown, the yoke is attached to a horizontal rod or shaft V which slides in guide holes in lugs $v$ on the underside of the shift frame, one end of the rod extending to the side of the machine, see Fig. 7, where it can be grasped and operated to shift the yoke. Any other suitable means might be employed for shifting the yoke.

The ribbon vibrating mechanism described is not dependent upon the arrangement of the ribbons or the feeding and reversing mechanism therefor. The vibrator would operate in the same manner whether the ribbons are wound side by side or one over the other on a single pair of spools or each ribbon on separate spools.

I claim as my invention:

1. In a typewriting machine, a ribbon vibrator having integral side portions thereof bent inwardly and integral upper and lower portions thereof bent toward said inwardly bent side portions to form separate guides

for two ribbons, with separate openings therein to permit the insertion and removal of the ribbons, substantially as set forth.

2. In a typewriting machine, the combination of a movably supported ribbon guide having two openings therein, one of said openings being longer than the other, and a vibrating lever having a part normally engaging in the smaller opening to vibrate the guide, and adapted to be placed in the longer opening and to vibrate therein independently of the guide, substantially as set forth.

3. In a typewriting machine, the combination of a carriage shift frame, a vibrating ribbon guide and a pivoted vibrating lever for the same supported on said shift frame, a lever fulcrumed in rear of the vibrating lever pivot and having an arm projecting upwardly and forwardly, and a link pivotally connected to said lever arm and to the vibrating lever, substantially as set forth.

4. In a typewriting machine, the combination of a carriage shift frame pivoted at its rear portion, a vibrating ribbon guide supported by the shift frame, a vibrating lever connected at its front end to the ribbon guide and pivoted at its rear portion to the shift frame, an operating lever fulcrumed in rear of said lever, and a link pivoted to said arm and to said lever, the link being arranged to swing across a straight line passing through the pivotal axis of said shift frame and the pivotal connection between the link and said operating lever when said shift frame is shifted, substantially as set forth.

5. In a typewriting machine, the combination of a carriage shift frame, a ribbon guide, a lever for vibrating said guide pivoted on said shift frame, and operating connections for said vibrating lever including a link which extends from said vibrating lever in a direction substantially toward the pivotal axis of said shift frame whereby the movements of said vibrator lever are substantially the same in different positions of said shift frame, substantially as set forth.

6. In a typewriting machine, the combination of a ribbon vibrating lever, two fulcrums for said lever, and means for moving said fulcrums together to place one in supporting engagement with said lever and disengage the other from the lever, said fulcrums being so arranged relative to each other that one will engage the lever before the other disengages the lever, whereby the lever will always be supported by one of the fulcrums, substantially as set forth.

7. In a typewriting machine, the combination of a ribbon vibrating lever having two fulcrum openings, two fulcrums movable in the direction of their length and adapted to enter the openings of the lever from opposite directions, the fulcrums being so arranged relative to each other that one will enter its opening in the lever before the other leaves its opening, whereby the lever will always be supported by one of the fulcrums, substantially as set forth.

8. In a typewriting machine, the combination of a carriage shift frame, a ribbon guide, a vibrating lever for the same, a part which is supported by said shift frame and has two fulcrums for supporting said lever and which is movable to engage one fulcrum with and disengage the other fulcrum from said lever, and means for operating said vibrating lever, substantially as set forth.

9. In a typewriting machine, the combination of a carriage shift frame, a ribbon guide and vibrating lever for the same both supported by and moving with said shift frame, a movable supporting part for said lever which is carried by said shift frame and has two fulcrums for said lever and is movable to engage one fulcrum with and disengage the other fulcrum from said lever, and means for operating said vibrating lever, substantially as set forth.

10. In a typewriting machine, the combination of a platen, a shift frame for shifting the platen to different printing positions, a ribbon vibrator which shifts with said platen, a guide for said vibrator which is arranged to shift with said shift frame, means for vibrating said vibrator at the type strokes, and means which are supported by said shift frame and are movable for changing the throw of the vibrator, substantially as set forth.

11. In a typewriting machine, the combination of a carriage shift frame, a ribbon vibrator supported thereby, a vibrator lever fulcrumed on the shift frame and connected to the vibrator, means for shifting the fulcrum point of the vibrator lever to different positions relative to said lever to change the throw of the vibrator, a main frame supporting the shift frame, operating means for said vibrator lever supported by the main frame, and connections between said operating means and the vibrator lever whereby the lever may vibrate about different fulcrum points in different positions of the shift frame, substantially as set forth.

12. In a typewriting machine, the combination of a power-driven reciprocating rack, a pair of horizontal centrally pivoted ribbon feed levers, separate connecting rods pivoted to said rack and to the rear ends of said levers, and ribbon spools operatively connected to the front ends of said feed levers, substantially as set forth.

13. In a typewriting machine, the combination of a power-driven carriage, a pinion driven by the carriage driving power, a rack meshing with the pinion, a pair of ribbon spools, a pair of centrally pivoted horizontal levers operatively connected to the spools at their front ends, and connecting

rods pivotally connected to the rack and to the rear ends of the levers, substantially as set forth.

14. In a typewriting machine, the combination of a motor, a pair of ribbon spools, means for transmitting motion from the motor to said spools, including a pair of feed levers which swing together in the same direction, a pair of pivoted reversing levers for connecting said spools with and disconnecting them from said feed levers, and means for simultaneously swinging said reversing levers, substantially as set forth.

15. In a typewriting machine, the combination of a motor, a pair of spool shafts, a pair of feed levers oscillated together in the same direction by said motor, ratchet and pawl connections between said levers and said spool shafts, a pair of reversing levers having curved faces for holding said pawls out of engagement with said ratchets, and means for swinging one of said reversing levers into position to engage the pawl controlled thereby and the other lever into position to release the pawl controlled thereby, substantially as set forth.

16. In a typewriting machine, the combination of a pair of upright spool shafts, a pair of ratchet wheels secured to said shafts, a pair of feed pawls, means for constantly reciprocating said feed pawls, a pair of horizontal reversing levers pivotally mounted in front of the spool shafts for forcing the pawls out of contact with their ratchets, and a reciprocating rod at the front portion of the machine connecting the levers for swinging them on their pivots simultaneously to release one pawl and force the other pawl out of contact with its ratchet wheel, substantially as set forth.

17. In a typewriting machine, the combination of ribbon spools, driving devices therefor, connections between the driving device for one spool and that for the other spool, a spring acting in one direction on said connections, and a cam acting to hold said connections in either of two positions against the action of the spring, substantially as set forth.

18. In a typewriting machine, the combination of ribbon spools, driving devices therefor, connections between the driving device for one spool and that for the other spool, a cam controlling the position of said connections, and means acting when moved in the same way to move said cam to alternately cause opposite movements of said connections for rendering one driving device active and the other inactive, substantially as set forth.

19. In a typewriting machine, the combination of ribbon spools, driving devices therefor, connections between the driving device for one spool and that for the other spool, a spring acting on said connections in one direction, a cam acting to limit the movement of the connections in one direction and to force said connections in another direction, and means acting when moved in the same way to move the cam to alternately cause opposite movements of said connections, substantially as set forth.

20. In a typewriting machine, the combination of ribbon spools, driving devices therefor, connections from the driving device of one spool to that of the other spool, a rotatable cam acting on said connections to reverse the feed of the ribbon with every movement of the cam, and a part acting with every movement in the same direction to turn said cam from one reverse position to the other, substantially as set forth.

21. In a typewriting machine, the combination of ribbon spools, driving devices therefor, connections from the driving device of one spool to that of the other spool, a rotatable cam acting on said connections to reverse the feed of the ribbon, a ratchet wheel connected to the cam, and a pawl acting with every movement from normal position on said ratchet wheel to move the cam from one reverse position to the other, substantially as set forth.

22. In a typewriting machine, the combination of a pair of ribbon spools, driving means therefor, a pair of levers for rendering said driving means active on one spool and inactive on the other spool, means to cause said levers to move together, a spring acting in one direction on said levers, a pin or projection on one of said levers, a rotatable cam having a series of rests for said pin arranged alternately at different distances from the axis of the cam, and means for intermittently turning said cam, substantially as set forth.

23. In a typewriting machine, the combination of a pair of ribbon spools, driving means therefor, spring-operated means for rendering said driving means active on one spool and inactive on the other spool, a rotatable cam concentric with one spool shaft and having a series of cam surfaces that control the position of said spring-operating means to reverse the feed of the ribbon, and a manually movable part acting to turn said cam a part revolution with its every working movement, substantially as set forth.

24. In a typewriting machine, the combination of a pair of spools, driving means therefor, connections for rendering the driving means active on one spool and inactive on the other spool, a ratchet wheel, a cam connected thereto and arranged in working contact with said connections, a push rod supporting a pawl to act on the ratchet wheel, and a spring acting to yieldingly hold the pawl in contact with the ratchet and to restore said pawl and said feed rod to their normal positions, substantially as set forth.

25. In a typewriting machine, the combination with a platen and a carriage for the platen, of a shift frame which forms the entire support for the carriage and is movable to shift the platen to different printing positions, a ribbon vibrator lever mounted on the shift frame, and means for vibrating the lever the same distance with the carriage and shift frame in both the normal and shifted positions, substantially as set forth.

26. In a typewriting machine, the combination with a platen and a carriage for the platen, of a shift frame which forms the sole support for the carriage and is movable to shift the platen to different printing positions, a ribbon vibrator lever pivotally connected to the shift frame, key-actuated means for vibrating the lever the same distance at each printing operation with the platen in both the normal and shifted positions, and means for changing the throw of the lever, substantially as set forth.

27. In a typewriting machine, the combination of a platen, a carriage for the platen, a frame for shifting the carriage to place the platen in different printing positions, a ribbon vibrator which shifts with the carriage, a guide for said vibrator supported by the shift frame, means for vibrating the vibrator at the type strokes, and means movable independently of said vibrator for changing the throw thereof, substantially as set forth.

28. In a typewriting machine, the combination of a platen, a shift frame for shifting the platen to different printing positions, a ribbon vibrator and means for supporting, guiding and vibrating said vibrator all supported by and shiftable with said shift frame, and means also supported by said shift frame which are movable independently of said vibrator into different relations to said vibrator for changing the throw thereof, substantially as set forth.

29. In a typewriting machine, the combination with a platen and a carriage for the platen, of a shift frame which forms the entire support for the carriage and is movable to shift the platen to different printing positions, a ribbon vibrator which shifts with the carriage, a vibrator lever pivotally supported by the shift frame, and means for changing the throw of the lever, substantially as set forth.

Witness my hand, this 27th day of June, 1907.

OSCAR C. KAVLE.

Witnesses:
CHESTER W. REID,
OTTO A. SCHILLY.