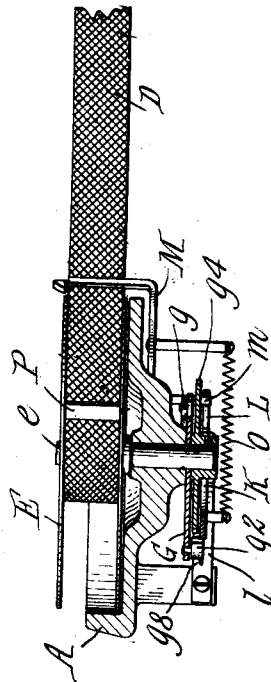
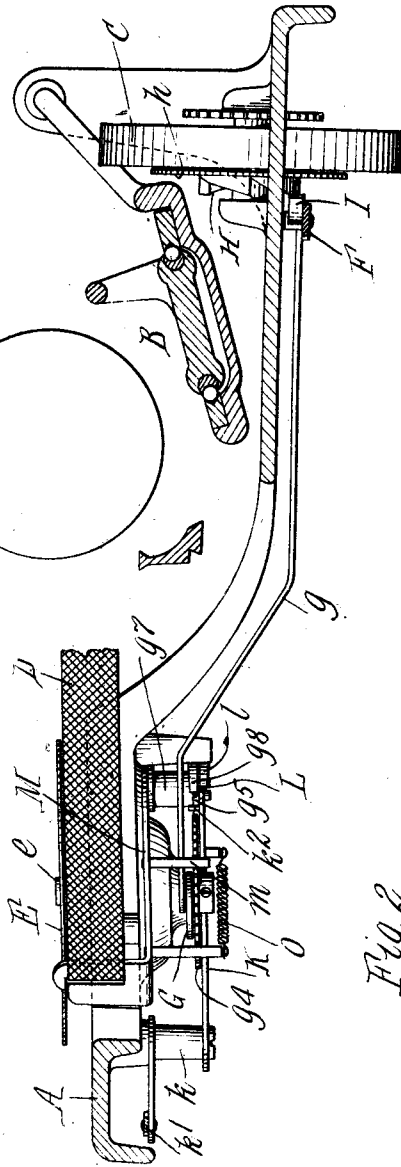


APPLICATION FILED NOV. 17, 1909.

3 SHEETS—SHEET 1.



A. G. Dimond
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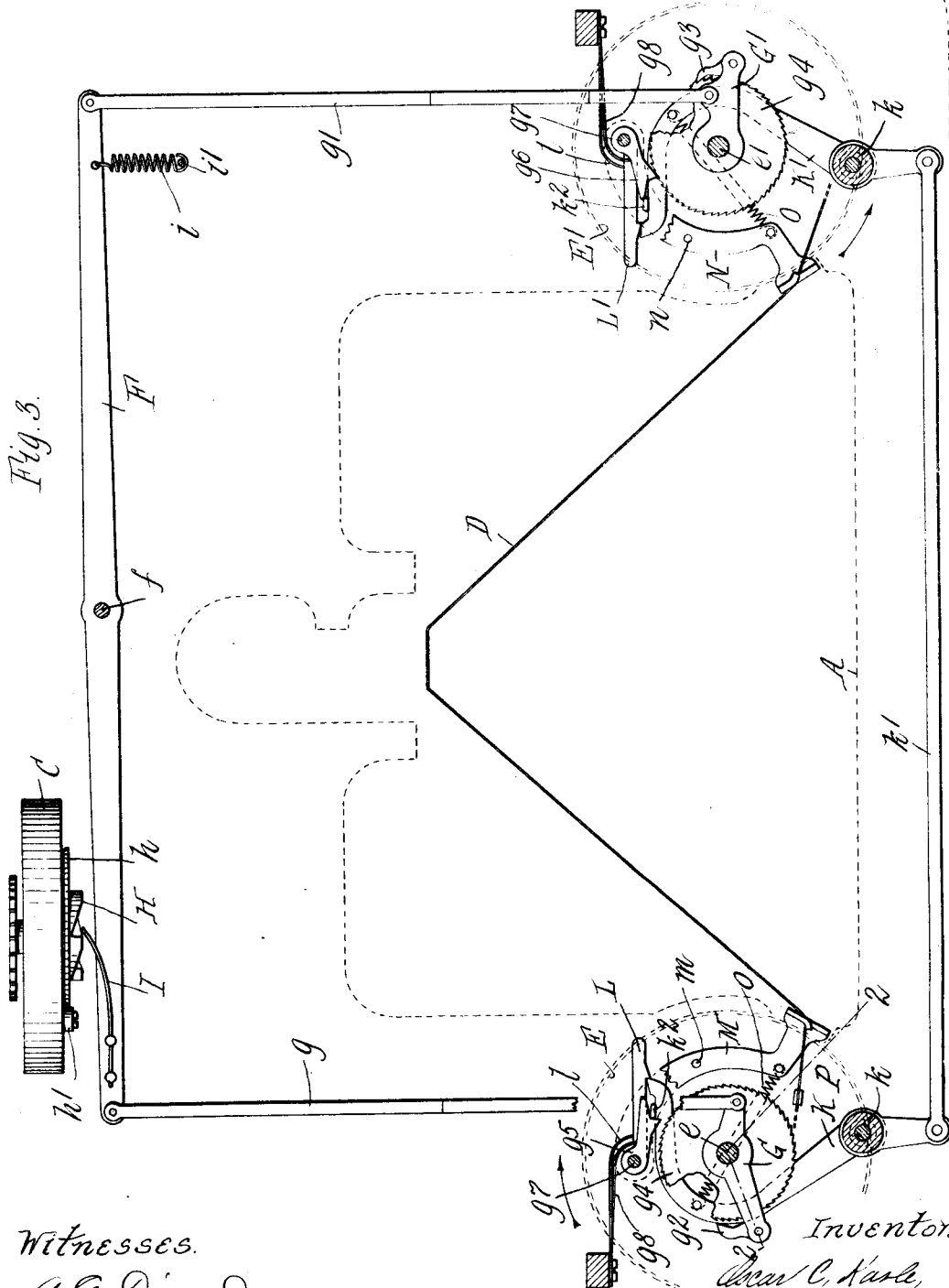
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RIBBON MECHANISM FOR TYPE WRITING MACHINES.

Patented June 24, 1913.

3 SHEETS--SHEET 2.

Fig. 3.



Witnesses.

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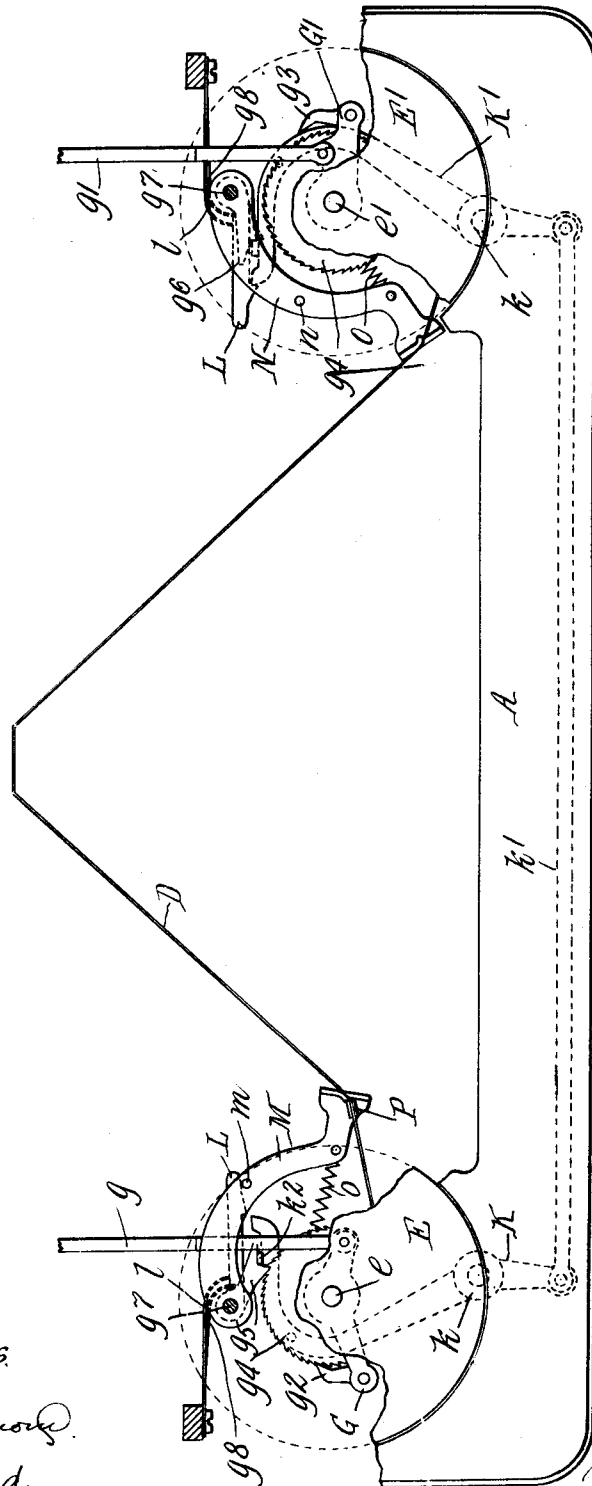
O. C. KAVLE.
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1,065,531.

Patented June 24, 1913.

3 SHEETS—SHEET 3.

Fig. 4.



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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.

1,065,531.

Specification of Letters Patent.

Patented June 24, 1913.

Application filed November 17, 1909. Serial No. 528,574.

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 improvements in ribbon feeding and feed reversing mechanisms for typewriting machines.

One object of the invention is to produce an efficient, practical and reliable mechanism for automatically reversing the feed of ribbon, which will act instantly at the proper time, but will not be liable to accidental actuation.

Other objects of the invention are to produce a ribbon feeding and reversing mechanism actuated by the carriage driving power, which requires but little power for its operation; also to so construct the ribbon feeding mechanism that it will be noiseless in operation and can be manufactured at a small cost; and also to improve ribbon feeding and feed reversing mechanisms in the respects hereinafter described and set forth in the claims.

In the accompanying drawings, consisting of three sheets: Figure 1 is a fragmentary longitudinal sectional elevation of a typewriting machine provided with ribbon operating mechanism embodying the invention. Fig. 2 is a sectional elevation thereof in line 2-2, Fig. 3. Fig. 3 is a plan view thereof, partly in horizontal section, omitting the top plate and ribbon spools. Fig. 4 is a fragmentary broken plan view thereof, showing a different position of the parts.

Like reference characters refer to like parts in the several figures.

A represents the top plate of the frame of a front-strike typewriting machine; B the platen carriage; C the spring or power-operated drum which is connected to the carriage by means (not shown) for causing the carriage to move to the left in the usual manner; D the ink ribbon which passes through a vibrating guide (not shown) adjacent to the printing point of the platen, and has its ends attached to spools E and E' which are preferably situated in the usual location, at the opposite sides of the front portion of the machine, and are at-

tached to the upper ends of upright shafts *e* and *e'* journaled in bearings on the top plate. These parts may be of any usual or suitable construction.

The mechanism for operating the spools to feed the ribbon lengthwise is preferably constructed as follows: F represents a feed lever arranged beneath the rear portion of the top plate A and suitably pivoted between its ends thereto at *f* to swing horizontally. The opposite ends of the feed lever are connected by links *g g'* to pawl levers G G', respectively, which are loosely journaled on the lower ends of the spool shafts *e e'* and carry feed pawls *g²* and *g³* provided with hidden springs which tend to hold the pawls in engagement with ratchet wheels *g⁴* fixed to the spool shafts. *g⁵* and *g⁶* represent holding dogs which are preferably pivoted by screws on the lower ends of studs *g⁷* screwed to and depending from the top plate, and which are pressed toward the ratchet wheels *g⁴* by suitable springs *g⁸* secured to depending lugs on the top plate for holding the ratchet wheels and spools from backward rotation. The teeth of the two ratchet wheels are preferably pitched in opposite directions, and one of the pawl levers, for instance, G, is fulcrumed between its ends and the pawl and operating link *g* are connected to the opposite ends thereof, while the other pawl lever, G', has its pawl and operating link *g'* connected thereto at the same side of its fulcrum so that the two spools will be turned in opposite directions by the oscillation of the feed lever F. Both pawl levers are oscillated by the movements of the feed lever F, but the feed pawl and holding dog for one spool are held out of action when the pawl and dog for the other spool are in action, by reversing mechanism hereinafter described, so that when the ribbon is being wound on one spool the other spool is left free for the ribbon to unwind therefrom.

H represents a cam driven by the carriage-driving spring drum C for operating the feed lever F. The cam is preferably connected to the drum by a ratchet wheel *h* and pawl *h'*, or other clutch device, which causes the cam to rotate with the drum in one direction but permits the drum to rotate in the opposite direction independently of the cam. The cam has an annular series of projections, each having an inclined or cam

face and an abrupt face. A yielding or spring finger I on the feed lever is caused to bear against the face of the cam below its axis by a suitable spring i , Fig. 3, connected to the lever and to a pin or part i' depending from the top plate A. In action, the spring finger I rides up on one inclined face of the cam and gradually swings the feed lever F in one direction until the peak of this cam face clears the end of the spring lever, when the spring i will instantly swing the lever in the opposite direction and return the spring finger I to the base of the next inclined face of the cam. Thus the feed pawl which is in action is gradually advanced to turn its spool, then quickly retracted to take a new hold and its advance movement immediately commenced again, so that a slight forward movement of the ribbon is made with each letter space movement of the carriage. The cam can be made with any desired number, one or more, of the inclined faces or sections, but a plurality of such faces is preferable to a single face extending around the cam.

The ribbon feed mechanism above described is substantially like that disclosed in my pending application, Serial No. 445,983, filed July 29, 1909, with, however, the following important difference: Instead of the slip joints and springs connecting the links g and g' to the feed lever F, employed in the former mechanism, the links have ordinary pivotal connections with the ends of the lever and the yielding or spring finger I is used, which provides a yielding connection between the driving cam and the spools. This spring finger normally acts as a rigid part of the lever, but in the event that the ribbon feed is obstructed the finger can yield and permit the cam faces to pass it without injury to the ribbon. The single spring finger performs the same function as the two springs and slip joints in the former construction and, in addition, has two other functions. It absorbs the slight shock when the feed lever snaps back from one cam face to another and practically eliminates the noise incident thereto. This noise was barely discernible with the rigid projection on the lever formerly used, and by the present construction there is no perceptible noise. Secondly, as the spring finger I drops from the peak of one cam face to the base of the next, the momentum of the lever F slightly compresses the spring finger and causes the feed pawls g^2 and g^3 to move backwardly on the ratchet wheels farther than they otherwise would, thereby insuring the proper engagement of each pawl with the last tooth within its range of movement and thus preventing the lost motion that sometimes happens when a feed lever having a rigid projection engaging the cam is employed.

The motion of the feed lever F actuated as described could be transmitted to the ribbon spools by ratchet and pawl or clutch devices of different construction from those described.

The mechanism for reversing the feed of the ribbon is preferably constructed as follows: K K' represent two oppositely arranged reversing levers which are fulcrumed on pivots k depending from the top plate A and have rearwardly-projecting curved arms located under the ratchet wheels g^4 in position to engage the feed pawls g^2 and g^3 to move them out of engagement with the ratchet wheels, and forwardly-projecting arms connected by a horizontal bar k' located under the front portion of the top plate. These reversing levers are preferably made of sheet metal arms connected by a hub, and the curved arms of the levers have upturned projections k^2 adapted to engage inclined faces at the free ends of the holding dogs g^5 and g^6 , see Fig. 3, for moving the dogs out of engagement with the ratchet wheels.

L and L' represent latches provided with shoulders adapted to engage the rear ends of the reversing levers K and K' for holding the levers in the position in which they hold the feed pawls and holding dogs out of action, as shown at the left in Fig. 3. The latches are preferably pivoted on the same screws as the holding dogs g^5 and g^6 and are pressed toward the reversing levers by suitable springs l . The springs g^5 and l for each holding dog and its companion latch are conveniently made from a single piece of spring metal by slitting it for the greater portion of its length to form two independently acting spring portions.

M and N represent two oppositely arranged ribbon guide or latch releasing levers which are preferably fulcrumed on the upper ends of the screw studs g^7 to which the holding dogs g^5 and g^6 are pivoted. The guide levers are provided with upwardly projecting free ends having guide slots for the ribbon, and with depending trip pins m and n which are adapted to strike and trip the latches L and L' to release the reversing levers. The reversing levers and guide lever for each spool are connected by a spring O, conveniently attached to studs depending from said levers, which tends to draw the two levers toward the axis of the spool and hold the guide lever in the normal position shown in Fig. 3. The ribbon is provided near its ends with reversing obstructions or projections P, one of which is shown in Figs. 2 and 3. These reversing projections can not pass through the ribbon slots of the guide levers, and when the ribbon is nearly unwound from one of the spools the guide projection will engage and swing the adjacent guide lever from the normal position

shown in Fig. 3 to that shown at the left in Fig. 4.

The operation of the reversing mechanism is as follows: In the position of the parts shown in Fig. 3, the feed pawl and holding dog for the right-hand spool are in action, and the ribbon is being wound upon the right-hand spool, the pawl and dog for the left-hand spool being held out of engagement with their ratchet wheel by the reversing lever K so that the left-hand spool is left free for the ribbon to unwind therefrom. The reversing lever for the unwinding spool K is retained in the position shown, against the pull of the spring O, by the latch L, while the other reversing lever K' is held out of engagement with the pawl and dog of the winding spool by its spring O, and the two guide levers M and N are held in the normal position shown, by the springs O. The ribbon is nearly exhausted from the left-hand spool. As the feed of the ribbon continues, the reversing projection P at the left-hand end of the ribbon will engage the adjacent guide lever M and slowly swing the lever around until its trip pin *m* trips the latch L and releases the reversing lever K, as shown at the left in Fig. 4. When the reversing lever K is released its spring O acts instantly to swing the lever inwardly so as to free the feed pawl and holding dog for the left-hand spool and permit these to act on their ratchet wheel. The motion of the reversing lever K is transmitted by the bar *k*' to the other reversing lever K' and this lever forces the pawl and dog for the right-hand spool out of engagement with their ratchet wheel, as shown at the right in Fig. 4. The ribbon is then wound from the right-hand spool onto the left-hand spool, so that the feed of the ribbon is reversed. The reversing lever K' will be held in position to retain the right-hand pawl and dog out of action by its latch L' until the ribbon is exhausted from the right-hand spool and the reversing projection P at the right-hand end of the ribbon engages the adjacent guide lever N and moves this lever to cause the feed of the ribbon to be again reversed in a manner similar to that just described, but by the action of the spring O for the right-hand reversing lever. The springs O normally exert but very little pull on the reversing and guide levers and, in fact, they can be arranged so as not to exert any pull on the levers when the levers are in their normal inward positions, but the springs should exert a slight pull as soon as the guide levers begin to swing under the action of the reversing projections on the ribbon. It is important that the springs be extended and their tension increased by the movement of the guide levers, as the proper action of the mechanism depends upon the

change in tension of these springs. This change in tension of the springs O is produced alternately, or only when one of the spools is nearly exhausted so that the reversing projection at that end of the ribbon can act on the guide lever, and consequently both springs can not be extended at the same time in the ordinary operation of the machine.

Another important feature of the described construction is that the reversing projection P on the ribbon holds the guide lever at one spool in position to hold its spring O extended until after the reverse has been completed and the reversing lever for the other spool has been latched in its pawl and dog releasing position, and then with the retreat of the reversing projection the guide lever is drawn back to its normal position, or practically so, by its spring O. The feed of the ribbon cannot be reversed except by the movement of the guide lever at the unwinding spool, and the ribbon cannot therefore be accidentally reversed between the ends of its run. Unusual tension on the ribbon from any cause will not reverse the ribbon feed, but in case of such unusual tension the spring finger I of the feed lever will yield and allow the cam to pass, as before explained, and thus avoid tearing the ribbon. The ribbon feed can be reversed at any part of its run by moving the guide lever at the unwinding spool by hand.

Most of the parts of the ribbon mechanism described are made of sheet metal stampings. The reversing levers K K' are made from like stampings by bending the dog-operated lugs thereof in opposite directions. The guide levers M and N are also made from like stampings by bending the slotted guide portions in opposite directions. The feed pawls *g*² *g*³, holding dogs *g*⁵ *g*⁶, latches L and L', and links *g* and *g*' are all interchangeable. The whole mechanism can be made at a comparatively small cost; the entire mechanism is connected to and supported by the top plate A, which makes it inexpensive to assemble; and the holding dogs and latches, together with the guide levers, are mounted on the same pivot studs, all of which tends to economy in manufacture.

I claim as my invention:

1. In a typewriting machine, the combination of a ribbon, horizontally rotating spools therefor, horizontally moving driving connections for each spool, a spring actuated reversing lever for each spool which is arranged to swing horizontally adjacent to the spool and which in one position prevents the operation of the spool by the driving connections, a latch for holding each reversing lever against movement by the actuating spring, and a ribbon guide lever for each

spool which is actuated by the ribbon when the ribbon is nearly exhausted from said spool to release the reversing lever for said spool from its latch, substantially as set forth.

2. In a typewriting machine, the combination of a ribbon, horizontally rotating spools therefor, a ratchet and pawl for driving each spool, means for oscillating said pawls horizontally, a spring actuated reversing lever for each spool which is arranged to swing horizontally adjacent to the ratchet wheel for said spool and which in one position holds the companion pawl out of driving relation to the ratchet wheel, a latch for holding each reversing lever against movement by the actuating spring, and means which operate when the ribbon is nearly exhausted from one spool to release the reversing lever for said spool from its latch, substantially as set forth.

3. In a typewriting machine, the combination of a ribbon, spools for the ribbon, driving connections for each spool, a reversing lever for each spool, which in one of its positions prevents the operation of its spool by the driving connections thereof, a latch for holding each reversing lever in the position mentioned, a ribbon-actuated lever for each spool which releases the reversing lever from its latch, and a spring which connects the reversing and ribbon-actuated levers of each spool and moves the reversing levers to reverse the feed of the ribbon, when said reversing lever is released from its latch, substantially as set forth.

4. In a typewriting machine, the combination of a ribbon, spools for the ribbon, driving connections for each spool, a reversing lever for each spool, which in one of its positions prevents the operation of its spool by the driving connections thereof, a latch for holding each reversing lever in the position mentioned, a ribbon guide lever for each spool, a spring which connects the reversing and ribbon guide levers for each spool and moves the reversing levers to reverse the feed of the ribbon when said reversing lever is released from its latch, and means connected to the ribbon for actuating the guide lever adjacent to one spool for tripping the latch for the adjacent reversing lever when the ribbon is nearly exhausted from said spool, substantially as set forth.

5. In a typewriting machine, the combination of a ribbon, spools for the ribbon, driving connections for each spool, a pair of levers for each spool connected by a spring, a latch for holding one of said levers in position to prevent the operation of one spool by its drive connections, means for moving the other lever to release the first lever from said latch when the ribbon is nearly exhausted from said spool, and connections between the latch-controlled levers of the

spools whereby when one lever is unlatched the other lever is latched and the feed of the ribbon is reversed, substantially as set forth.

6. In a typewriting machine, the combination of a ribbon, spools for the ribbon, driving connections for each spool, connected reversing levers for the spools, which in one of its positions prevents the operation of its spool by the driving connections thereof, ribbon guide levers, a feed reversing spring connecting each guide lever to the companion reversing lever, an automatic latch for each reversing lever, and a reversing device on each end of the ribbon which actuates the adjacent guide lever to trip the latch when the ribbon is exhausted from the unwinding spool, substantially as set forth.

7. In a typewriting machine, the combination of a ribbon, spools for the ribbon, driving connections for each spool, a reversing lever for each spool, which in one of its positions prevents the operation of its spool by the driving connections thereof, a latch for holding each reversing lever in the position mentioned, a ribbon-actuated lever for each spool which releases the reversing lever from its latch, and a spring which acts when the reversing lever is released to first move the reversing levers to reverse the feed of the ribbon and then restore the ribbon-actuated lever to the normal position, substantially as set forth.

8. In a typewriting machine, the combination of a ribbon, spools for the ribbon, driving connections for each spool, a reversing lever for each spool, which in one of its positions prevents the operation of its spool by the driving connections thereof, a latch for holding each reversing lever in the position mentioned, a ribbon-actuated lever for each spool which releases the reversing lever from its latch, and a spring which connects the reversing and ribbon-actuated levers of each spool and is placed under tension by the movement of the ribbon-actuated lever and moves the reversing levers to reverse the feed of the ribbon when said reversing lever is released from its latch, substantially as set forth.

9. In a typewriting machine, the combination of a ribbon, spools for the ribbon, driving connections for each spool, connected reversing levers which normally prevent the rotation of one spool by its driving connections and allow the rotation of the other spool, latches which act alternately to hold the reversing levers from action, a lever for each spool which is actuated to release the companion reversing lever from its latch when the ribbon is nearly exhausted from said spool, and springs each of which connects the reversing lever and the automatically acting lever for one spool and which act alternately to move the reversing levers

for reversing the feed of the ribbon, substantially as set forth.

10. In a typewriting machine, the combination of a ribbon, spools for the ribbon, driving connections for each spool, reversing levers which normally prevent the rotation of one spool by its driving connections and allow the rotation of the other spool, a top plate for the machine, a connecting bar for the reversing levers located under the front portion of the top plate, and means actuated automatically by the ribbon to swing said reversing levers and connecting bar alternately in opposite directions for reversing the feed of the ribbon, substantially as set forth.

11. In a typewriting machine, the combination of a ribbon, a pair of ribbon spools arranged on substantially vertical axes, a pair of spool-driving clutches, driving means for said clutches, a pair of reversing levers for alternately holding said clutches out of action, a pair of latches for said reversing levers, a pair of ribbon guide levers which act to trip said latches to alternately release the reversing levers, and a pair of springs connecting the reversing levers to the guide levers, all of said parts except the clutch-driving means being located substantially under the spools, substantially as set forth.

12. In a typewriting machine, the combination of a ribbon, a pair of ribbon spools, a pair of spool-driving clutches, driving means for said clutches, a pair of reversing levers for alternately holding said clutches out of action, a pair of latches for said reversing levers, a pair of ribbon guide levers for tripping said latches, and springs for operating said reversing levers, said reversing levers, latches, and guide levers all having pivotal axes substantially parallel with the axes of the spools, substantially as set forth.

13. In a typewriting machine, the combination of a top plate, a pair of ribbon spools mounted on the front portion of the top plate, clutch-driving means mounted on the top plate, and means for reversing the feed of the ribbon, comprising a pair of spool-driving clutches, reversing levers, latches for the reversing levers, ribbon guide levers, and a connecting bar for the reversing levers all arranged under the top plate and moving in planes substantially parallel therewith, substantially as set forth.

14. In a typewriting machine, the combination of a ribbon, spools for the ribbon, driving connections for each spool, connected reversing levers which normally prevent the rotation of one spool by its driving connections and allow the rotation of the other spool, latches which act alternately to hold the reversing levers from action, a latch-releasing lever for each spool, a spring connecting the reversing and latch-releasing

levers of each spool, and a device near each end of the ribbon which acts on the adjacent latch releasing lever to first increase the tension of one spring enough to overcome the resistance of the other spring and then to trip the latch and permit the spring with the increased tension to shift the reversing levers for reversing the feed of the ribbon, substantially as set forth.

15. In a typewriting machine, the combination of a ribbon, spools for the ribbon, driving connections for each spool, connected reversing levers which normally prevent the rotation of one spool by its driving connections and allow the rotation of the other spool, two reversing springs, means for normally holding the reversing levers from being actuated by said springs, and means actuated by the ribbon for straining said springs alternately and releasing the reversing levers to permit the actuation thereof by the spring which is strained, substantially as set forth.

16. In a typewriting machine, the combination of a driving motor, ribbon spools, ratchet and pawl connections between the motor and each of the spools, a holding dog for each spool ratchet, a reversing lever for holding the pawl and dog for each spool out of engagement with the ratchet, a latch for each reversing lever, ribbon guide levers for tripping the latches, and a single stud or part for supporting said holding dog, latch, and guide lever for each spool, substantially as set forth.

17. In a typewriting machine, the combination of a rotary cam, a lever pivoted intermediate its ends and having a part which is adapted to yield, means for holding said yieldable part of the lever yieldingly against the cam, a pair of ribbon spools, and drive connections between said lever and each of said spools, substantially as set forth.

18. In a typewriting machine, the combination of a rotary cam, a lever pivoted intermediate its ends and having a spring finger which is adapted to yield, a spring for holding said spring finger against the cam, a pair of ribbon spools, a clutch for each spool, and links connecting said clutches to the ends of said lever, substantially as set forth.

19. In a typewriting machine, the combination of a rotary cam having a series of inclined cam faces each terminating in an abrupt face, a pivoted lever having a part which rides over the inclined faces of the cam and drops from one to the other of said faces, said part being elastic to absorb the shock of the sudden stopping of the lever, a pair of ribbon spools, and driving connections between the spools and the pivoted lever, substantially as set forth.

20. In a typewriting machine, the combination of a rotary cam having a series of

inclined cam faces each terminating in an abrupt face, a lever pivoted between its ends, a pair of ribbon spools, ratchet and pawl connections between said ribbon spools and
5 said lever, a part on said lever, and means for holding said part yieldingly against the inclined faces of the cam and for causing it to drop from one to the other of said
10 faces, said part being elastic to permit the pawls to swing farther in one direction than the cams move them in the other direction, substantially as set forth.

21. In a typewriting machine, the combination of a rotary cam, a lever pivoted between its ends, a pair of ribbon spools, driv-

ing connections between the ends of said lever and said spools, a yieldable part on said lever, and means for holding said yieldable part yieldingly against said cam, said yieldable part being adapted to yield and permit the rotation of the cam without operating the lever in the case of an abnormal strain on the ribbon, substantially as set forth.

Witness my hand, this 11th day of November, 1909.

OSCAR C. KAYLE.

Witnesses:

CHESTER W. REID,

OTTO A. SCHILLY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."