Feb. 14, 1933. W. A. DOBSON 1,897,243

TYPEWRITING MACHINE

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Fig. 2.

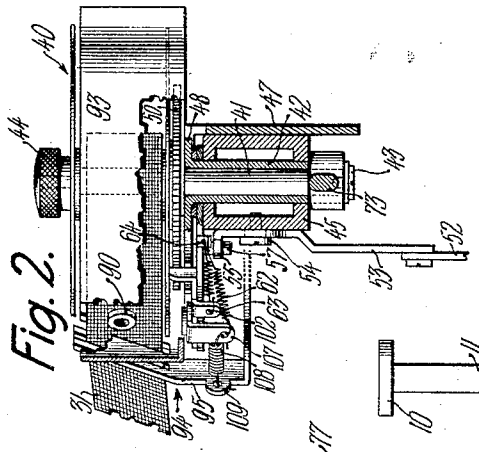

Fig. 1.

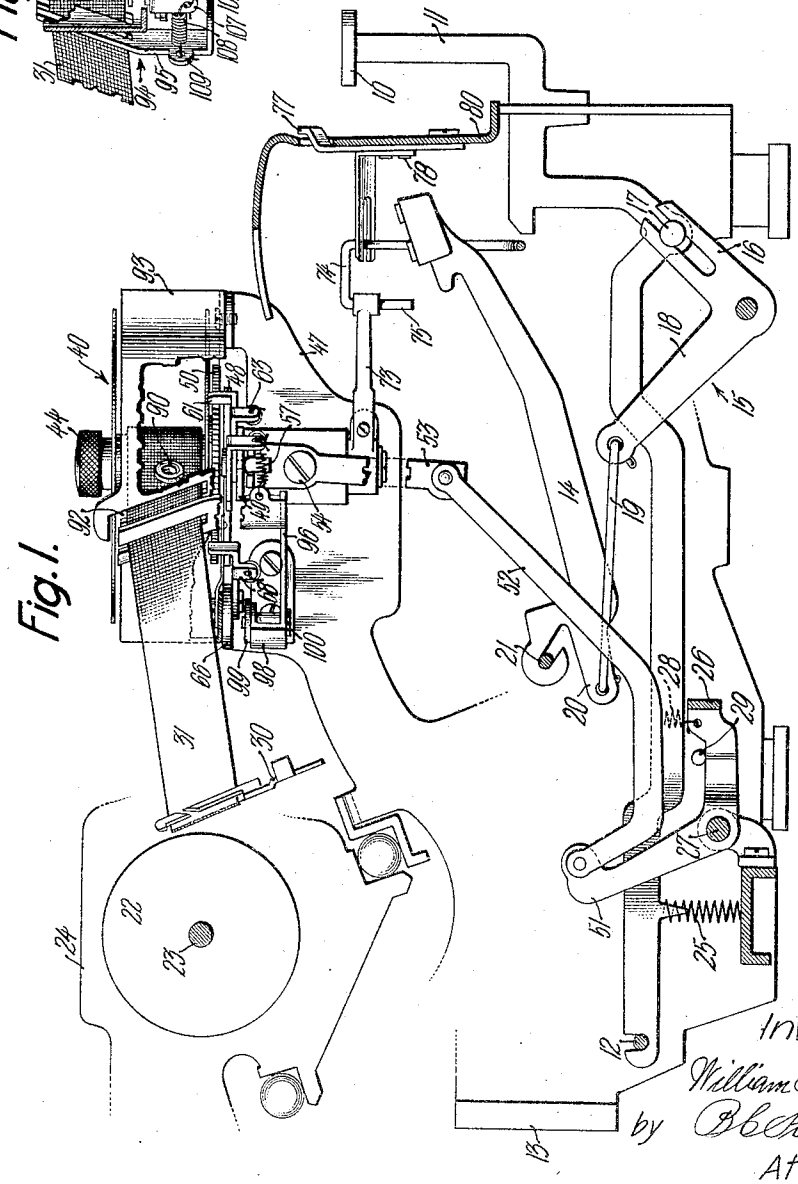

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Fig. 3.

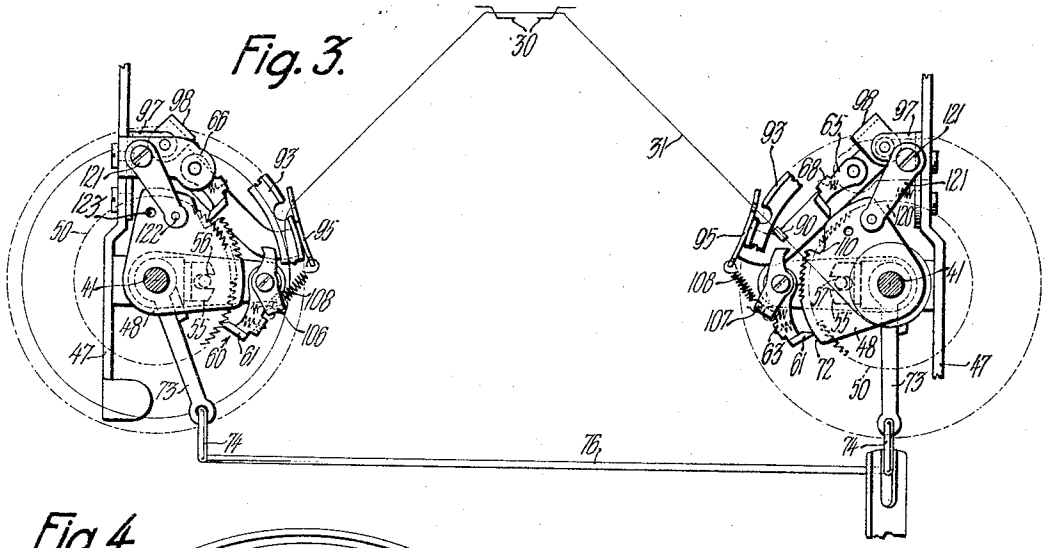


Fig. 4.

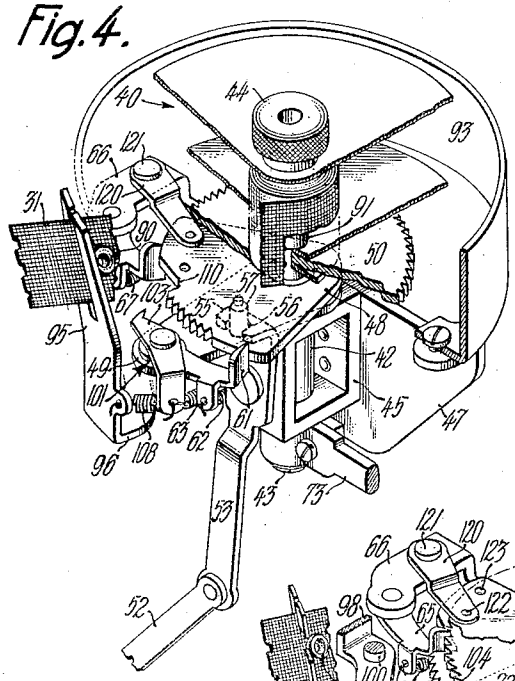


Fig. 5.

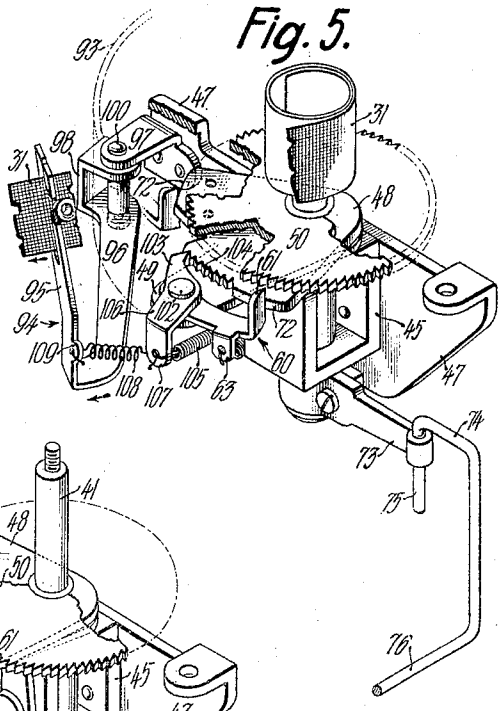
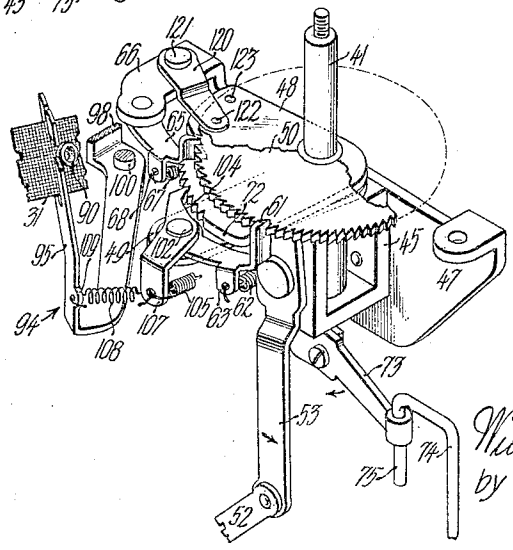


Fig. 6.



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Patented Feb. 14, 1933

1,897,243

UNITED STATES PATENT OFFICE

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TYPEWRITING MACHINE

Application filed April 6, 1929. Serial No. 352,980.

The present invention relates generally to ribbon mechanism for typewriting machines, and more particularly to automatically reversing the direction of ribbon-feed, especially in a portable typewriting machine.

The present invention is very compactly arranged, and is made up of a few small, light parts, which do not appreciably increase the weight or expense of the machine.

Normally-ineffective reversing mechanism is set in condition for operation when the ribbon is nearly unwound, and is held in this condition while it is being operated by a succession of key-strokes, and effects the reversal of the ribbon-winding direction. The operation requires very little power, and this power is divided up among a plurality of key-strokes, and the direction of ribbon-feed is automatically reversed without appreciably increasing the resistance of the keys to the touch of the fingers.

The work, moreover, is done without appreciably tautening the ribbon.

In carrying out the invention, a light, compactly disposed ribbon-feed-reversing cam is provided with a plurality of ratchet-teeth for engagement with a normally-ineffective drive-pawl compactly mounted on an oscillating member which operates at every key-stroke to wind the ribbon. A slotted lever, through which the ribbon passes, is mounted adjacent the pawl, and has a yielding connection therewith to swing the same to effective position upon a small predetermined unwinding movement of the ribbon. The lever and connection co-operate to permit further easy feeding movement of the ribbon while the reversing cam is being rotated to a position wherein it is effective upon a final operative movement to reverse the rotation of the playing-out ribbon-spool almost instantaneously.

Other features and advantages will hereinafter appear.

In the accompanying drawings,

Figure 1 is a fragmentary sectional view, front to rear, of an Underwood portable typewriting machine, having my invention applied thereto.

Figure 2 is a fragmentary cross-section through the mechanism associated with the right-hand ribbon-spool, the cross-section being taken at a substantial right angle to the plane of the section in Figure 1. In this view certain of the parts are shown in elevation.

Figure 3 is a fragmentary plan view of the ribbon-spools of the present invention and certain associated parts which illustrate how the ribbon-feeding mechanism of one spool operates reversely from the ribbon-feed mechanism of the other spool. In this view the left-hand spool is disposed for winding up the ribbon and the other spool is feeding out the ribbon.

Figure 4 is a fragmentary perspective view of the right-hand ribbon-spool and the associated mechanism of the present invention for automatically reversing the ribbon-feed. In this view the ribbon is shown substantially unwound from the spool, and a button on the ribbon is about to engage with, and set, the reversing mechanism for operation by subsequent key-strokes.

Figure 5 is a view similar to Figure 4, wherein the reversing mechanism is shown having begun to be operated by subsequent key-strokes.

Figure 6 is a view similar to Figure 5, wherein the reversing mechanism is shown as having been operated by a plurality of type-strokes, the ribbon-feed mechanism being now set for winding the ribbon on the right-hand spool.

The present invention is illustrated in connection with an Underwood portable typewriting machine, in which keys 10 are fastened on key-levers 11, each of which is pivotally mounted on a lateral rod 12 fast to the main frame 13. Each lever is operatively connected to a type-bar 14 by interponents including a bell-crank 15 having a forward slotted arm 16 for engagement with a pin 17 in the lever 11, and a rear arm 18 connected by a link 19 to a lower arm-member 20 of an associated type-bar 14. Each type-bar is pivotally mounted on a curved rod 21 fast on a segment, not shown, and depression of its associated key 10 causes it to be swung rearwardly against a platen 22 mounted on a shaft 23 journaled in a carriage 24. A spring

25 returns each lever 11 and its associated type-bar 14 to normal position after each type-stroke. The parts described hereinbefore may be of usual construction.

Upon depression of a key 10, the platen-carriage 24 is letter-spaced from right to left by usual instrumentalities, not shown, and the lever 11 of the operated key is swung downwardly against a universal bar 26, which is disposed a short distance below the lever and is mounted for oscillation on a usual rock-shaft 27. The lever is normally urged upwardly by a contractile spring 28 against a stop 29.

Interponents, not shown, operatively connect the universal bar 26 to a ribbon-vibrator 30, through which a ribbon 31 is threaded in the usual way, the vibrator being vibrated upwardly in front of the printing point just before a type on a type-bar 14 strikes the platen. The construction of the universal bar 26 and the vibrator 30 and the interponents connecting the latter to the bar, may be substantially the same as disclosed in my co-pending application No. 67,297, filed November 6, 1925 (now Patent No. 1,715,906, dated June 4, 1929).

It is usual in typewriter construction to have the ribbon 31 reeled on two spools, generally designated as 40, rotatably mounted on opposite sides of the printing point for winding the ribbon alternately from one spool to the other, through the vibrator 30, a small amount at each type-stroke. In carrying out the present invention, each spool is journaled on the upper portion of a vertical spindle 41, the lower portion of which is journaled in a vertical bushing-member 42 and is held therein by a screw 43 in the lower end of the spindle. Thumbnuts 44 hold the spools in place on the spindles 41. The bushing 42 is rotatably mounted on a bracket 45, which may have the form of a short section of rectangular tubing, which may be fastened by screws, not shown, to an adjacent side plate 47 of the usual shift-frame. A cam-plate, preferably having the form of a sector, is generally designated as 48, and is fastened to the upper end of each bushing 42 for purposes to appear hereinafter. Between the cam-plate and the top of the bracket 45, is disposed a thin inreaching arm 49 which is pivoted about the bushing 42 for a purpose to presently appear.

A usual ratchet-wheel 50 is fixed upon each spindle 41 between the cam-plate 48 and the ribbon-spool 40, being spaced away from the spool and the cam-plate by usual hub-portions. A usual upreaching pin, not shown, on each ratchet-wheel releasably engages in a hole, not shown, in the associated ribbon-spool, and operatively fastens the latter to its ratchet-wheel.

To the end that a small amount of ribbon 31 may be wound on one of the spools 40 and off the other spool each time a character is typed, two upreaching arms 51 are fastened on the rock-shaft 27, one arm being disposed adjacent each side plate 47. A forwardly and upwardly extending link 52 connects the upper end of each arm 51 to the lower end of an uprightly-disposed lever 53, which is pivoted about a shoulder-screw 54 threaded in the wall of the adjacent bracket 45. A short portion of the upper end of each lever 53 is bent inwardly to form a wrist-member 55, which has an open slot 56 for engaging about a depending pin 57 fastened to the arm 49.

A drive-pawl 60 is pivotally mounted on the outer end of each arm 49 and has an upreaching tooth 61 for engagement with the adjacent ratchet-wheel 50 toward which it is urged by a contractile spring 62, which has one end fastened to a depending lug 63 on the pawl 60, and the other end to a depending lug 64 on the arm 49.

As will appear hereinafter, one of the drive-pawls 60 is always disposed in effective position, and the other pawl is always in ineffective position. The depression of any key 10 will be effective to oscillate each of the pawls 60 on the arms 49 and will therefore rotate step by step the ratchet-wheel 50, which is associated with the effectively-disposed pawl. The principle of operation of the drive-pawl mechanism may be substantially the same as set forth in the patent to Lee S. Burridge, No. 1,249,022, dated December 4, 1917.

To prevent reverse movement of a ratchet-wheel 50, while being driven ahead by its drive-pawl 60, a detent-pawl 65 is pivoted on an inreaching bracket-arm 66 integrally joined to the adjacent shift-frame side plate 47, and is urged toward the ratchet-wheel by a contractile spring 67, which has one end fastened to a depending lug 68, and the other end fastened to the adjacent side plate 47.

The ratchet-wheels 50 and the pawls 60 and 65 are oppositely disposed, and it is necessary to hold the pawls of one spool ineffective while the ribbon is being unwound from the spool associated with the ineffective pawls. To this end, each cam-plate sector 48 has two cam-edges 72 effective upon rotation of the cam-plate for camming the pawls 60 and 65 away from the ratchet-wheel associated with the spool on which the ribbon is being unwound. The principle of operation of the cam-plate may be substantially the same as the operation of the cam-plate disclosed in the above-noted patent to Burridge, except as is hereinafter noted.

To arrange for one set of pawls 60 and 65 to be moved by spring-action to effective positions simultaneously as the other set of pawls is cammed to ineffective positions, a forwardly-extending arm 73 may be adjustably fastened, as by clamping, to the lower end of each bushing 42, which protrudes be-

low the bracket 45. The forward end of the arms 73 are operatively connected by a substantial U-shaped connecting link 74 of stiff wire. The upper end portion of each upright member of the U-shaped link is bent at a right angle rearwardly and then downwardly. Each downwardly-bent end portion 75 of the link engages loosely in a vertical hole provided in the forward end of the adjacent arm 73. This construction permits the horizontal face portion 76 of the U-shaped link to be disposed beneath the forward ends of the type-bars 14.

To the end that the feed of the ribbon may be manually reversed at will, an upwardly-extending lever 77 is pivoted on a screw 78 against the inner face of a front plate 80 and adjacent the right side of the machine. The construction and operation of the lever 77 and its operative connection with the link 74 may be substantially the same as is set forth in the co-pending application of George H. Myers, No. 282,303, filed June 2, 1928 (now Patent No. 1,808,505, dated June 2, 1931).

To the end that the feed of the ribbon 31 from either ribbon-spool to the other may be automatically reversed when susbtantially all of the ribbon has been unwound from one of the spools 40, two buttons or rivets 90 are fastened to the ribbon for co-operation with novel mechanism of the invention, which is effective for reversing the feed of the ribbon-spools. The reversing mechanism, except as hereinafter noted, will be described for only the right-hand spool, it being understood that a similar mechanism is to be employed for the other spool. One button 90 is positioned adjacent each end of the ribbon, a distance therefrom that preferably will leave one or two turns of the ribbon around a usual core 91 of the adjacent spool, when the button moving with the ribbon toward the vibrator 30 has passed through a slot 92 in the wall of the usual ribbon-cup 93, and has engaged against the upper end of a slotted lever 94, hereinafter called a ribbon guiding or setting lever.

The setting lever 94 includes an uprightly-disposed arm 95, whose lower end is integrally joined to a rightwardly-extending body 96, the plane of the body being substantially transversely disposed to the plane of the arm 95, as shown in Figures 3 and 6. The body 96 is pivotally mounted on a bracket 97, which may be riveted to the adjacent side plate 47 of the shift-frame. For mounting the body 96 on the bracket 97, the right end of the body is bent upwardly and then bent forwardly, forming a substantial U-shaped end portion 98, which may have two apertures, one vertically disposed above the other, for receiving a pivot-screw 100, which, passing through the apertures, engages in the bracket 97. The arm 95 is normally disposed against the wall of the adjacent cup 93.

To make the movement of the arm 95 by the button 90 away from the spool 93 effective for setting mechanism, hereinafter described, in position to reverse the ribbon-feed, a drive-pawl 101 is mounted on the end of the arm 49, and may be pivoted on a pin 102, which also forms the pivot of the drive-pawl 60. The right end of the drive-pawl 101 has a tooth 103 for engaging ratchet-teeth 104 cut in the cam-plate 48 between the cam-edges 72 at each side of the cam-plate sector. The tooth 103 is normally held out of engagement with the ratchet-teeth 104 by a weak tensile-spring 105 which has one end fastened to a down-reaching extension 106 of an arm 107 of the pawl 101 on the opposite side of its pivot from the tooth 103. The other end of the spring 105 may be fastened to the lug 64. To move the tooth 103 into operative engagement with the teeth 104, a tensile-spring 108 has one end fastened to the extension 106 and the other end to an ear 109 on the arm 95, adjacent the lower end of the latter. Then when the button 90, being drawn toward the vibrator 30, swings the arm 95 about the pivot-screw 100 away from the cup 93, the spring 108 pulls the pawl 101 clockwise into engagement with the teeth 104. This engagement of the tooth 103 of the pawl 101 and the teeth 104 is accomplished by short movement of the button 90 after it engages against the arm 95. Thereafter at each subsequent operation of a key 10, the arm 49 is oscillated by the above-described interponents between it and the keys 10. It will be seen from inspection of Figures 5 and 6 that as the arm 49 is oscillated at each key-stroke, the forward cam-edge 72 is moved rearwardly with respect to the tooth 61 until the forward extremity of the cam-edge reaches the pawl and lets the tooth be pulled by the spring 62 into engagement with the ratchet-wheel 50, which is operatively connected to the ribbon-spool 40. At the same time the rear cam-edge 72 is moved out from engagement with the detent-pawl 65 until a notch 110 in the cam-plate 48 is moved up to the tooth of the detent-pawl, which permits the latter to be moved into engagement with the ratchet-wheel 50 by the spring 67.

Rotation of the right-hand cam-plate 48 by the drive-pawl 101 is effective to rotate in a reverse direction the left-hand cam-plate 48 through the above-described operative connection between the cam-plates, which connection includes the arm 73 and the link 74. It can be seen from inspection of Figure 3 that the reverse rotation of the left-hand cam-plate 48 will move its cam-edges 72 into engagement with the teeth of the drive-pawl 60 and the detent-pawl 65, and move these members into ineffective positions where they will not interfere with the unwinding of the ribbon from the left-hand spool.

It will be noted from inspection of the ex-

treme forward portions of the cam-edges 72 (Figure 3) and the tapered points of the teeth 61 that when the cams 48 have been partly operated to bring these forward cam-edge portions opposite the teeth, a small final operative movement of the cams will be effective to cam one tooth clear of its associated ratchet-wheel and let the other tooth be pulled into engagement with its ratchet-wheel. A sufficiently large final operative movement of the cams may be had during a single key-stroke, thus causing the actual reversing of the ribbon-winding mechanism to be done in a very short space of time.

At the next operation of a key 10, following the final operative movements of the cams 48, the right-hand ratchet-wheel 50 is rotated counterclockwise and begins to wind up the ribbon 31 on the right-hand spool. During the operation of the first few keys after the ribbon begins to wind on the right-hand spool 40, the pawl remains engaged with the teeth 104, which is not objectionable, since the right-hand drive-pawl 60 is ineffective. Then, as the right-hand button 90 moves away from the right-hand arm 95, the tension in the spring 108 is released, and the drive pawl 101 is swung to normal ineffective position by the spring 105, which also furnishes power for moving the lever 94 back up against the cup 93.

To retain the cam-plates 48 positively in either their effective or ineffective positions, detent means are provided which include, for each plate, a weak leaf-spring-member 120, which may have one end fastened by a rivet 121 to the bracket 66, and may have the other end provided with a small downwardly-extending bump or knob 122, which is arranged for engagement in either of two detent-holes 123 in the cam-plate adjacent its rear side. The friction of the spring 120 also serves as a dog-pawl for co-operation with the drive-pawl 101.

It will be noted that the ratchet-teeth 104 cut in the cam-plates 48 are reversely positioned relatively to the teeth in the ratchet-wheel 50. This is advantageous because it permits the drive-pawl 101 to move the cam-plate 48 during the downward depression of a key 10, as can be seen by inspection of Figures 1 and 6. It will be noted that the ratchet-wheel 50 is moved during the return of a depressed key 10 by power provided by the spring 28. By having the cam-plate 48 move on the down stroke of a key 10 instead of the return movement, it is not necessary to increase the strength of the spring 28, which, if done, would mean an additional effort on the part of the typist to overcome the strength of the spring every time a key was depressed, and since the cam-plates are only operated during a few strokes of the keys 10 for each feeding of the entire ribbon by the printing point, it can be readily seen that the operation of the cam-plate 48 by a stronger spring 28 would result in a great waste of power, which is avoided by the present arrangement. The present arrangement also makes for compactness.

It will be understood that while the mechanism of the present invention has been described in connection with a so-called portable typewriting machine, it can be employed with certain modifications, which a typewriter mechanic can make, with a so-called standard typewriting machine.

It will be noted at Figures 1 and 3 that the slots 92 in the spool-cups 93 are merely clearance slots, and the ribbon-guiding and ribbon-ironing-out features belong to the slots in the arms 95, and the arms 95 are ribbon-guides, each guide swingable about a pivot 100 that is so disposed that its ribbon-guide swings in the same plane as the direction of ribbon-feed; that it is possible at times for the vibrating pawl 101 to so grip the teeth 104 that a single actuation of the key-driven arm 49 will release the inoperative pawl 60 and the ribbon-reverse will be instantaneous; that the guide is swingable by means movable with the feeding ribbon; that each typing operation vibrates a pawl that may be operative or inoperative according to the ribbon-control position of the ribbon-guide; and that the only extra stress thrown into the normal ribbon-feed is the swinging of the vibrating pawl 101 into engagement with the ribbon-reversing cam-plate 48 by the tensioning of the light guide-restoring spring 108.

Variations may be resorted to within the scope of the invention, and portions of the improvements may be used without others.

Having thus described my invention, I claim:

1. In a ribbon-feed-reversing mechanism for a typewriting machine, the combination of a ribbon-spool, means for rotating said spool to wind the ribbon thereon, including a ratchet-wheel disposed in a plane parallel to said spool and below the same, an arm oscillated by each key-stroke in a plane parallel to said ratchet-wheel, a drive pawl pivoted on said arm, and spring urged into operative engagement with said ratchet-wheel, a rotary-mounted plate-member coaxial with said ratchet-wheel and parallel thereto and having cam-edges for engaging said pawl and moving it out of engagement with said ratchet-wheel, a plurality of ratchet-teeth on said plate-member, a second drive pawl pivoted on said arm coaxial with said first-named pawl for engagement with the teeth of said plate-member for operatively moving the latter, a spring urging said last-named drive pawl out of effective engagement with said teeth, and means controlled by the unwinding of the ribbon to move said last-named pawl into operative engagement with the teeth of said plate-member, whereby

the latter may be operatively moved by subsequent key-strokes for the purpose set forth.

2. In a ribbon-feed-reversing mechanism for a typewriting machine, the combination of a ribbon-spool, means for rotating said spool to wind the ribbon thereon, including a ratchet-wheel disposed in a plane parallel to said spool and below the same, an arm oscillated by each key-stroke in a plane parallel to said ratchet-wheel, a drive pawl pivoted on said arm, and spring urged into operative engagement with said ratchet-wheel, a rotary-mounted plate-member coaxial with said ratchet-wheel and parallel thereto and having a cam-edge for engaging said pawl and moving it out of engagement with said ratchet-wheel, a plurality of ratchet-teeth on said plate-member, a second drive pawl pivoted on said arm, coaxial with said first-named pawl for engagement with the teeth of said plate-member for operatively moving the latter, a spring urging said last-named drive pawl out of effective engagement with said teeth, and means controlled by the unwinding of the ribbon to move said last-named pawl into operative engagement with the teeth of said plate-member, whereby the latter may be operatively moved by subsequent key-strokes, said ribbon-controlled means arranged for moving said plate-operating pawl into operative position by a small unwinding movement of said ribbon, and further arranged for holding said pawl in said operative position during a greater subsequent unwinding movement of said ribbon without appreciably tautening the latter.

3. In a ribbon-feed-reversing mechanism for a typewriting machine, the combination of a ribbon-spool, means for rotating said spool to wind the ribbon thereon, including a ratchet-wheel disposed in a plane parallel to said spool and below the same, an arm oscillated by each key-stroke in a plane parallel to said ratchet-wheel, a drive pawl pivoted on said arm, and spring urged into operative engagement with said ratchet-wheel, a rotary-mounted plate-member coaxial with said ratchet-wheel and parallel thereto and having a cam-edge for engaging said pawl and moving it out of engagement with said ratchet-wheel, a plurality of ratchet-teeth on said plate-member, a second drive pawl pivoted on said arm, coaxial with said first-named pawl for engagement with the teeth of said plate-member for operatively moving the latter, a spring urging said last-named drive pawl out of effective engagement with said teeth, means operated by the unwinding of the ribbon to move said last-named pawl into operative engagement with the teeth of said plate-member, whereby the latter may be operatively moved by subsequent key-strokes for the purpose set forth, said ribbon-controlled means including a button on said ribbon, a displaceable member arranged for engagement by said button and mounted for movement thereby away from said last-named pawl, and a yielding connection between said displaceable member and said last-named pawl stronger than the spring which urges said last-named pawl out of engagement with its associated ratchet-teeth.

4. In a ribbon-feed-reversing mechanism for a typewriting machine, the combination of a ribbon-spool, instrumentalities for rotating said spool to wind the ribbon thereon, including a member oscillated by each typing stroke, said member being pivoted about the axis of said spool, cam-devices disabling said spool-rotating instrumentalities, a normally inoperative pawl mounted on said oscillating member, and yielding means controlled by the unwinding movement of the ribbon for moving said pawl into engagement with said cam-devices to be oscillated thereby and release the spool-rotating instrumentalities.

5. In a typewriting machine of the kind described, in combination, a ribbon-spool, an axially-disposed ratchet-wheel below said spool and operatively connected thereto, an arm axially disposed with respect to said ratchet-wheel and oscillated in a plane parallel to said ratchet-wheel by each key-stroke, a cam-plate compactly disposed between said arm and said ratchet-wheel and rotatable in a plane parallel to said ratchet-wheel, ratchet-teeth on said cam-plate oppositely sloped from the ratchet-teeth on said ratchet-wheel, and two compactly coaxially-mounted pawls on said arm, one of said pawls being arranged to rotate said ratchet-wheel and the other of said pawls being made effective upon a predetermined movement of the ribbon of said machine to rotate said cam-plate, said cam-plate upon rotation by said pawl being effective to disable said first-named pawl.

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