

PATENT SPECIFICATION

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DRAWINGS ATTACHED

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 1CY



(54) IMPROVEMENTS IN OR RELATING TO RIBBON FEED
 AND REVERSING MECHANISM FOR TYPEWRITERS

(71) I, EDWARD VICTOR BYERS, a British subject of 17 Cavendish Crescent North, The Park, Nottingham, do hereby declare the invention for which I pray that a Patent may be granted to me and the method by which it is to be performed to be particularly described in and by the following statement:—

The invention concerns typewriters of the type having a traversing carriage, and two rotatable mountings for two ribbon spools between which spools the ribbon is fed as the carriage traverses, the mountings being driven alternately in opposite directions so that the ribbon is first wound onto one spool and drawn off the other and is subsequently wound back onto the other spool and drawn off the first spool, whereby each spool is alternately wound and subsequently emptied. The invention is especially concerned with an improved mechanism for securing the automatic reversal of the ribbon feed when either spool becomes empty.

This invention provides a ribbon feed and reversing mechanism for a typewriter of the type hereinbefore specified and comprising ratchet means associated with each spool mounting and rotatable therewith, cam means rotatably driven by traversing movement of the carriage, pawl means associated with each ratchet means and providing pawl and ratchet arrangements therewith and arranged to be oscillated by rotation of the cam means, the construction and arrangement being such that one pawl means is engageable with its associated ratchet means to rotate the associated spool mounting whilst the other pawl means is disengaged from its associated pawl means thereby to wind ribbon onto a spool on the mounting of which the ratchet means and pawl means are engaged, and reversing means operable in response to increased tension in the ribbon to effect disengagement of said one pawl means and allow engagement of the other pawl means whereby to reverse the direction of feed of the ribbon.

[Price 25p]

Preferably the cam means is such that, when the mechanism is in use in a typewriter of the type hereinbefore specified, it can be rotated first in one direction and then in the other as the carriage makes its alternate typing and return traverses.

Preferably the ratchet means associated with each spool mounting comprises a toothed ratchet wheel fixed to the mounting which is in the form of a spindle.

Preferably the pawl means associated with each ratchet wheel comprises an elongate element provided adjacent one end with pawls arranged to engage the teeth of the ratchet wheel and at the other end being co-operable with said cam means.

Preferably the cam means comprises a triangular-shaped cam which is mounted for rotation on a fixed spindle which is connected with the carriage so as to be rotated when the carriage traverses when the typewriter is in use, the mechanism further comprising a device which is oscillatable by rotation of the cam and is normally held in one of a plurality of rotational positions by a detent unless prevented from being oscillated whereupon said device is moved by the cam from one to another of the rotational positions, said reversing means being controlled by the rotational position of said device.

Preferably said reversing means comprises an eccentric which is rotatable with said device between alternative positions for controlling the pawl and ratchet arrangements, a female member encircling the eccentric and displaceable thereby to alternative positions, and control connections extending from the female member to the pawl and ratchet arrangements whereby one or the other of the latter is rendered inoperative according to the position of the female member. Preferably the control connection extending from the female member to each pawl and ratchet arrangement comprises a control bar movable endwise by the female member between operative and inoperative positions.

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In order that the invention may be better understood, reference will now be made by way of example to a mechanism according to the invention which has been selected for description with reference to the drawings accompanying the provisional specification in which:—

Fig. 1 is a sectional view of a ribbon feed and reversing mechanism according to the invention;

Fig. 2 is an inverted plan view of a portion thereof, partly in section;

Fig. 3 is an inverted plan view of a further portion of the mechanism;

Fig. 4 is an end elevation of the pawl and ratchet mechanism for driving a representative one of the two ribbon mountings, and

Fig. 5 is an exploded view showing the main components of the feed and reversing mechanism of Fig. 1.

In the drawings, those parts of the typewriter, of the type specified, which are not essential to an understanding of the invention (e.g. the keyboard, platen, carriage and associated mechanisms) are not illustrated, such parts being of a conventional and generally understood character.

The ribbon feed and reversing mechanism comprises a driving spindle 10 which (being coupled to the carriage by any suitable mechanism, not shown) rotates first in one direction then the other as the carriage makes its alternate typing and return traverses, and two spool spindles 11, 12 each rotatably driven through a pawl and ratchet arrangement by rotation of the driving spindle 10. The three spindles 10, 11 and 12 are appropriately journaled in the frame or chassis 13 of the typewriter and the included angle between the lines joining the axis of the spindle 10 with the axes of the spindles 11 and 12 is 90° or nearly so. The upper end portions of the two spindles 11, 12 provide rotatable spool mountings for the removable reception of two typewriter spools 14, 15 between which the ribbon 16 extends. The function of the mechanism according to this invention is to wind the ribbon off a full spool (such for example as the spool 14) onto an empty spool (such for example as the spool 15) and, when the initially full spool 14 becomes empty and the initially empty spool 15 becomes full, to reverse the direction of the ribbon feed so that the ribbon is then wound back onto the spool 14 from the spool 15.

At their lower ends the spindles 11, 12 carry ratchet means in the form of ratchet wheels 17, 18 respectively, having oppositely arranged teeth so that the spindles can be racked round in opposite directions. On its lower end portion the spindle 10 carries cam means provided by a driving cam 19 having a plurality of circumferentially-spaced crests or lobes to produce a plurality of complete oscillations of an oscillating device, herein-

after described, during each revolution of the spindle 10. In the illustrated construction the cam 19 is substantially triangular and operates in a substantially square track-recess 20 (Figure 2) within a track wall 21 provided on the upper surface of a disc 22. The shape of this track-recess 20 is shown in Figure 2; it is a star-like or asteroid shape. The track wall 21 is located within holes 23a, 24a (Figure 5) in annular portions 23, 24 formed in first end portions of pawl means comprising elongate elements in the form of pawl-carrying bars 25, 26 respectively. The hole 24a in the bar 26 is substantially circular and the track wall 21 is a rotational fit therein. The hole 23a in the bar 25 is elongated in a direction transverse to the length of that bar to permit a detent nose 33, to ride on outer surfaces of the track wall 21. The other end portion of the bar 25 has a pair of oppositely directed pawls 27 for racking the ratchet wheel 17 in one direction, and two recesses 28. Similarly the opposite end portion of the bar 26 has two oppositely directed pawls 29 for racking the ratchet wheel 18 in the opposite direction, and two recesses 30. The first end portion of the bar 25 has an elongate slot 54 extending transverse to the length of the bar, in which slot a pin 31 on the first said end portion of the bar 26 is engaged, the two bars being coupled together by a tension spring 32. This spring holds the detent nose 33, projecting inwards from the periphery of the hole 23a in the bar 25 into engagement with any one of four detent notches 34 provided one in each of the four outer faces of the wall 21. It will thus be appreciated that the disc 22 (which, with its track wall 21 and parts 43, 44, 45 hereinafter described, constitute the aforesaid oscillatable device) has four alternative rotational positions but is normally prevented from rotation, while ribbon feed is taking place, by the detent nose 33 engaging in one of the notches 34.

As a result, for each complete rotation of the triangular cam 19 the disc 22 is caused to make three complete oscillations which oscillate the bars 25, 26 and so cause either the spindle 11 or the spindle 12 to be racked round by one or other of the pawl and ratchet mechanisms consisting of the pawls 27 on the bar 25 and the teeth of the ratchet wheel 17 and the pawls 29 on the bar 26 and the teeth of the ratchet wheel 18. One or other of these pawl and ratchet mechanisms is rendered inoperative while the other is rendered operative by mechanisms now to be described.

Below the pawl bars 25, 26 there are respective control bars 35, 36 which are pivotally connected to one another at 53. Near its free end the bar 35 carries two upstanding pins 37 (Figure 1) adapted to engage in the recesses 28 in the underside of the bar 25, while near its free end the control bar 36

carries upstanding projections 38 adapted to engage in the recesses 30 in the underside of the pawl bar 26. The arrangement is such that if either one of the control bars 35 and 36 is retracted towards the axis of the shaft 10 the other one is projected. The projections 37 or 38 of the retracted bar 35 or 36 engage the recesses 28 or 30 of the respective pawl bar 25 or 26 and thus permit the pawls of that bar to engage the teeth of the ratchet wheel 17 or 18 as the case may be. The projections 38 or 37 of the projected control bar 36 or 35 are disengaged from these recesses and therefore hold the associated pawl bar 26 or 25 in an upper position in which its pawls cannot engage the associated ratchet wheel so that the latter is freely rotatable. Springs 41 acting on the discs 42 urge the pawl bars 25, 26 downwards.

One control bar is projected and the other retracted when either spool 14, 15 ceases to rotate, by the mechanism now described. At the underside of the disc 22 there is an annular wall 43 having projecting from it a long radial lug 44 and two shorter lugs 45 extending at 90° to the lug 44. These lugs and the annular wall in effect constitute an eccentric device; they are located in a hole 46 through a female member 47 provided on the end of the bar 36. The periphery of the hole 46 has four inwardly protruding lands 48 spaced at 90° around the periphery. One of these lands is engaged by the long lug 44 and two others are engaged by the shorter lugs 45 while the remaining land is engaged by the periphery of the wall 43. Thus according to whichever of the four lands 48 is engaged by the long lug 44 (that is to say, according to the rotational position of the disc 22 and the eccentric device) one or other of the bars 35, 36 will be held projected and the other retracted. In Figure 3 the bar 36 is held projected, and the bar 35 is retracted, and this results in the spindle 11 being racked round the spindle 12 being freely rotatable to allow ribbon to be unwound therefrom as it is wound onto the spindle 11.

When either of the spool spindles 11, 12 is held against rotation when the ribbon has been completely unwound therefrom, the associated pawl bar 25 or 26 is prevented from oscillating and this in turn prevents the disc 22 from being oscillated by the rotating cam 19. Rotation of the cam 19 therefore causes the disc 22 to rotate so that one of the notches 34 which has hitherto been engaged by the nose 33 is disengaged therefrom and the next notch 34 is brought to a position in which it is engaged with the nose. Thus the disc 22 and the parts 43 to 45 thereon make a movement through 90° between alternative positions and this causes the long lug 44 at the underside of the disc 22 to remove itself from one land 48 on the bar 36 (with which land it has hitherto been engaged to hold the

control bar 35 or 36 projected) and to move rotationally into engagement with the next land 48. Thereby the female member 47 is displaced and the first mentioned control bar is retracted and the other control bar is projected, with the result that the drive is transferred from one of the spindles 11, 12 to the other spindle so that the ribbon is wound alternatively onto the spool 14 from the spool 15 and subsequently onto the spool 15 from the spool 14.

The resistance to rotation of the spools, resulting in the changeover, occurs because one end of the ribbon 16 is anchored to the spool 14 and the other end to the spool 15. Thus when one spool becomes empty the pull of the ribbon prevents that empty spool and its spindle, from being rotated and simultaneously the fact that the end of the ribbon is anchored to the empty spool prevents the full spool, and its spindle, from being rotated.

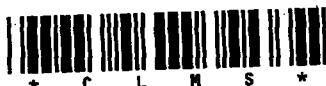
The cam 19 is formed on the underface of a member 50 keyed to the spindle 10 and positioned against a shoulder on the latter. The inner ends of the bars 25, 26, 35, 36 and the disc 22, are positioned between the member 50 and a disc 51 which is a push fit on the end of the spindle. This disc has a cylindrical boss 52 (Figure 1) extending through the disc 22 into engagement with the under face of the cam 19.

The various parts 17, 18, 19, 22, 25, 26, 35, 36, 42, 50 and 51 may be moulded from a suitable plastic material.

It is within the scope of the invention to drive the spindle 10 through a one-way coupling, or free wheel device, so that the spindle is only rotated as the carriage makes its typing traverses and is not rotated during the reverse traverses.

WHAT I CLAIM IS:—

1. A ribbon feed and reversing mechanism for a typewriter of the type hereinbefore specified and comprising ratchet means associated with each spool mounting and rotatable therewith, cam means rotatably driven by traversing movement of the carriage, pawl means associated with each ratchet means and providing pawl and ratchet arrangements therewith and arranged to be oscillated by rotation of the cam means, the construction and arrangement being such that one pawl means is engageable with its associated ratchet means to rotate the associated spool mounting whilst the other pawl means is disengaged from its associated pawl means thereby to wind ribbon onto a spool on the mounting of which the ratchet means and pawl means are engaged, and reversing means operable in response to increased tension in the ribbon to effect disengagement of said one pawl means and allow engagement of the other pawl means whereby to reverse the direction of feed of the ribbon.



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carries upstanding projections 38 adapted to engage in the recesses 30 in the underside of the pawl bar 26. The arrangement is such that if either one of the control bars 35 and 36 is retracted towards the axis of the shaft 10 the other one is projected. The projections 37 or 38 of the retracted bar 35 or 36 engage the recesses 28 or 30 of the respective pawl bar 25 or 26 and thus permit the pawls of that bar to engage the teeth of the ratchet wheel 17 or 18 as the case may be. The projections 38 or 37 of the projected control bar 36 or 35 are disengaged from these recesses and therefore hold the associated pawl bar 26 or 25 in an upper position in which its pawls cannot engage the associated ratchet wheel so that the latter is freely rotatable. Springs 41 acting on the discs 42 urge the pawl bars 25, 26 downwards.

One control bar is projected and the other retracted when either spool 14, 15 ceases to rotate, by the mechanism now described. At the underside of the disc 22 there is an annular wall 43 having projecting from it a long radial lug 44 and two shorter lugs 45 extending at 90° to the lug 44. These lugs and the annular wall in effect constitute an eccentric device; they are located in a hole 46 through a female member 47 provided on the end of the bar 36. The periphery of the hole 46 has four inwardly protruding lands 48 spaced at 90° around the periphery. One of these lands is engaged by the long lug 44 and two others are engaged by the shorter lugs 45 while the remaining land is engaged by the periphery of the wall 43. Thus according to whichever of the four lands 48 is engaged by the long lug 44 (that is to say, according to the rotational position of the disc 22 and the eccentric device) one or other of the bars 35, 36 will be held projected and the other retracted. In Figure 3 the bar 36 is held projected, and the bar 35 is retracted, and this results in the spindle 11 being racked round the spindle 12 being freely rotatable to allow ribbon to be unwound therefrom as it is wound onto the spindle 11.

When either of the spool spindles 11, 12 is held against rotation when the ribbon has been completely unwound therefrom, the associated pawl bar 25 or 26 is prevented from oscillating and this in turn prevents the disc 22 from being oscillated by the rotating cam 19. Rotation of the cam 19 therefore causes the disc 22 to rotate so that one of the notches 34 which has hitherto been engaged by the nose 33 is disengaged therefrom and the next notch 34 is brought to a position in which it is engaged with the nose. Thus the disc 22 and the parts 43 to 45 thereon make a movement through 90° between alternative positions and this causes the long lug 44 at the underside of the disc 22 to remove itself from one land 48 on the bar 36 (with which land it has hitherto been engaged to hold the

control bar 35 or 36 projected) and to move rotationally into engagement with the next land 48. Thereby the female member 47 is displaced and the first mentioned control bar is retracted and the other control bar is projected, with the result that the drive is transferred from one of the spindles 11, 12 to the other spindle so that the ribbon is wound alternatively onto the spool 14 from the spool 15 and subsequently onto the spool 15 from the spool 14.

The resistance to rotation of the spools, resulting in the changeover, occurs because one end of the ribbon 16 is anchored to the spool 14 and the other end to the spool 15. Thus when one spool becomes empty the pull of the ribbon prevents that empty spool and its spindle, from being rotated and simultaneously the fact that the end of the ribbon is anchored to the empty spool prevents the full spool, and its spindle, from being rotated.

The cam 19 is formed on the underface of a member 50 keyed to the spindle 10 and positioned against a shoulder on the latter. The inner ends of the bars 25, 26, 35, 36 and the disc 22, are positioned between the member 50 and a disc 51 which is a push fit on the end of the spindle. This disc has a cylindrical boss 52 (Figure 1) extending through the disc 22 into engagement with the under face of the cam 19.

The various parts 17, 18, 19, 22, 25, 26, 35, 36, 42, 50 and 51 may be moulded from a suitable plastic material.

It is within the scope of the invention to drive the spindle 10 through a one-way coupling, or free wheel device, so that the spindle is only rotated as the carriage makes its typing traverses and is not rotated during the reverse traverses.

WHAT I CLAIM IS:—

1. A ribbon feed and reversing mechanism for a typewriter of the type hereinbefore specified and comprising ratchet means associated with each spool mounting and rotatable therewith, cam means rotatably driven by traversing movement of the carriage, pawl means associated with each ratchet means and providing pawl and ratchet arrangements therewith and arranged to be oscillated by rotation of the cam means, the construction and arrangement being such that one pawl means is engageable with its associated ratchet means to rotate the associated spool mounting whilst the other pawl means is disengaged from its associated pawl means thereby to wind ribbon onto a spool on the mounting of which the ratchet means and pawl means are engaged, and reversing means operable in response to increased tension in the ribbon to effect disengagement of said one pawl means and allow engagement of the other pawl means whereby to reverse the direction of feed of the ribbon.

2. A mechanism according to claim 1, wherein the cam means is such that, when the mechanism is in use in a typewriter of the type hereinbefore specified, it can be rotated first in one direction and then in the other as the carriage makes its alternate typing and return traverses.

3. A mechanism according to either one of claims 1 and 2 wherein the ratchet means associated with each spool mounting comprises a toothed ratchet wheel fixed to the mounting which is in the form of a spindle.

4. A mechanism according to claim 3 wherein the pawl means associated with each ratchet wheel comprises an elongate element provided adjacent one end with pawls arranged to engage the teeth of the ratchet wheel and at the other end being co-operable with said cam means.

5. A mechanism according to either one of claims 3 and 4 the cam means comprises a triangular shaped cam which is mounted for rotation on a fixed spindle which is connected with the carriage so as to be rotated when the carriage traverses when the typewriter is in use, the mechanism further comprising a device which is oscillatable by rotation of the cam and is normally held in one of a plurality of rotational positions by a detent unless prevented from being oscillated whereupon said device is moved by the cam from one to

another of the rotational positions, said reversing means being controlled by the rotational position of said device.

6. A mechanism according to claim 5 wherein said reversing means comprises an eccentric which is rotatable with said device between alternative positions for controlling the pawl and ratchet arrangements, a female member encircling the eccentric and displaceable thereby to alternative positions, and control connections extending from the female member to the pawl and ratchet arrangements whereby one or the other of the latter is rendered inoperative according to the position of the female member.

7. A mechanism according to claim 6 wherein the control connection extending from the female member to each pawl and ratchet arrangement comprises a control bar movable endwise by the female member between operative and inoperative positions.

8. Ribbon feed and reversing mechanism according to claim 1, substantially as described herein with reference to and substantially as shown in the drawings accompanying the provisional specification.

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