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(54) TYPEWRITER RIBBON FEED MECHANISM

(71) We, INTERNATIONAL BUSINESS MACHINES CORPORATION, a Corporation organized and existing under the laws of the State of New York in the United States of America, of Armonk, New York 10504, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to typewriter ribbon feed mechanisms.

In conventional typewriters, for example such as the IBM Selectric typewriter, print ribbon wound on a supply spool in a cartridge passes in and out of the cartridge in a ribbon path between the supply spool and a take-up spool. (IBM and Selectric are registered trade marks). The typist, when mounting the cartridge in the typewriter, handles the print ribbon placing the ribbon on oscillating guides which form part of the typewriter mechanism. The take-up spool usually has a portion thereof which is engaged by drive mechanism on the typewriter to provide ribbon feed. If the ribbon is of a carbon type, a special lift-off erase tape ribbon may be employed. This is disclosed in patent specification No. 1,390,721 and the erase ribbon is mounted on a separate feed mechanism. The typist must also thread the lift-off erase tape ribbon through separate guides.

According to the invention, a typewriter ribbon feed mechanism for a cartridge having two ribbons therein with superposed surfaces of the ribbons exposed therethrough, comprises a cyclically operable print shaft, separate superposed feed drivers for the ribbons on a substantially common axis, a first cam driven from the print shaft, a first cam follower interconnecting the first cam and one of the ribbon feed drives to effect ribbon feed upon drive of the first cam by the print shaft, a second cam driven from the print shaft, a second cam follower interconnecting the second cam and the other ribbon feed drive, means normally to prevent ribbon feed upon drive of the second cam from the print shaft, and selectively operable

means to disable the ribbon feed prevention means to enable the second cam follower means to effect ribbon feed upon drive of the second cam from the print shaft.

The scope of the invention is defined by the appended claims; and how it can be carried into effect is hereinafter particularly described with reference to the accompanying drawings, in which:

Fig. 1 is an exploded perspective view of a cartridge assembly for a typewriter ribbon feed mechanism according to the present invention;

Fig. 2 is a schematic side elevational view of the cartridge assembly in position on a typewriter and illustrating the movement of the cartridge assembly relative to the print head and the platen;

Fig. 3a is an enlarged fragmentary view of a portion of the print ribbon when the print ribbon employed is a carbon type;

Fig. 3b is an enlarged fragmentary view of a portion of the print ribbon when the print ribbon is of a fabric ribbon;

Fig. 4 is a top plan view of a print ribbon cartridge of the assembly of Fig. 1;

Fig. 4A is a fragmentary sectional view on the line IVA-IVA of Fig. 4;

Fig. 5 is a plan view of the cartridge illustrated in Fig. 4 with the top cover removed;

Fig. 6 is a bottom plan view of the cartridge assembly of Fig. 1;

Fig. 7 is a similar view with the bottom cover of the erase ribbon cartridge removed;

Fig. 8 is a fragmentary sectional view on the line VIII-VIII of Fig. 6;

Fig. 9 is a schematic perspective view of a portion of the mechanism to accommodate the cartridge;

Fig. 10 is a side view of a mechanism of Fig. 9;

Figs. 11, 12 and 13 are fragmentary perspective schematic views illustrating the manner in which the cartridge assembly is inserted into the mechanism;

Fig. 14 is a fragmentary plan view of a portion of the apparatus of Figs. 9 to 13;

Fig. 15 is a fragmentary perspective view

illustrating the relationship between certain parts of the mechanism;

Fig. 16 is a fragmentary perspective view of a portion of the mechanism;

5 Fig. 17 is a cam timing diagram which illustrates both the ribbon feed and ribbon lift cam patterns for cams shown in Fig. 15;

Fig. 18 is a similar diagram for the erase function cam pattern for both feed and lift; and

10 Fig. 19 is a fragmentary exploded perspective view of a portion of the apparatus of Fig. 16.

A ribbon cartridge assembly 10 (Fig. 1) comprises a first cartridge 15 and a second cartridge 30, releasably connected in superposed relationship by snap pins 32 on the cartridge 30 engaged in apertures 17 (Fig. 5) in the cartridge 15.

20 The cartridge 15 comprises a case having a top cover 15a (Fig. 4) and a base 15b (Fig. 5) which carries external case wall 16a, thereby forming a chamber 16. The case includes a pair of guides 18a and 18b at whose ends are respectively located ribbon exit and entrance ports 23a and 23b which allow a print ribbon 12 (Fig. 4) to traverse a path externally of the case so as to be exposed to a printing element for a printing operation. A ribbon supply reel 19 includes a hub 19a which is mounted in the upper cover 15a and base 15b for rotation about a fixed axis. A drag wire 24 serves to maintain tension on the ribbon being extracted from the supply spool 19 and is more fully described in IBM Technical Disclosure Bulletin, Vol. 18, No. 4, September 1975, page 1093 in an article entitled "Ribbon Drag Wire". (IBM is the registered trade mark of International Business Machines Corporation.) The ribbon 12 exits through the exit port 23a and enters into the entry port 23b, past a guide pin 25 and then is wound on hub 20b of a take-up reel 20. The case is formed with cutaway portions to form an opening 22 to expose part of the reel 20 externally of the cartridge 15 and to provide a print ribbon advancing surface 20a engageable by external ribbon advancing means to rotate the reel 20 and draw ribbon from the reel 19.

50 In order to ensure that the print ribbon advancing surface 20a is held externally of the case so as to permit effective engagement thereof by the ribbon advancing means, the hub 20b of the reel 20 is rotatably carried by a depending end portion 26a of a rod 26. The end portion 26a (Fig. 4A) of the rod 26 extends downwardly through the hub 20b of the reel 20 and is engaged in a slot 21 in the base 15b of the cartridge 15. At its other end the rod 26 has a depending end portion 26b which is engaged in a slot 21a in the base 15b. A tension spring 27 is connected between the portion 26b and a fixed boss 15c on the top cover 15a of the cartridge 15. The arrange-

ment acts as a biasing means 23 to bias the reel 20 towards the opening 22. The depending end portion 26b of the rod 26 also serves to limit inward movement of the reel along the axis of the slot 21 by engagement with the peripheral ribbon winding on the supply reel 19.

70 The cartridge 30 comprises a case having a cover 30a (Fig. 6) and base 30b (Fig. 7) which carries external case wall 31a, thereby forming a chamber 31. With the cartridge 30 attached to the pins 32 in the apertures 17 the bases 15b and 30b are in mating engagement. The case includes a pair of guides 33a and 33b at whose ends are respectively located ribbon exit and entrance ports 33c and 33d which allow an erase tape ribbon 13 (Fig. 6) to traverse a path externally of the case so as to be exposed to a printing element for an erase operation. A ribbon supply reel 34 (Fig. 7) includes a hub 34a which is mounted in the cover 30a and base 30b for rotation about a fixed axis. A drag wire 34b, similar to the drag wire 24, maintains tension on the ribbon 13. The ribbon 13 exits through port 33c and enters port 33d and is then wound on hub 35b of a take-up reel 35. The case is formed with cutaway portions to form an opening 37, aligned with the opening 22, to expose part of the reel 35 externally of the case and to provide a ribbon advancing surface 35a engageable by external ribbon advancing means to rotate the reel 35 and draw ribbon from the reel 34.

100 In order to ensure that the ribbon advancing surface 35a is held externally of the case so as to permit effective engagement thereof by the ribbon advancing means, the hub 35b of the reel 35 is rotatably carried on a depending end portion 39a (Fig. 8) of a rod 39 which is engaged in a slot 36 in the base 30b of the cartridge 30. At its other end the rod 39 has a depending end portion 39b which is engaged in a slot 36a in the base 30b. A tension spring 40 is connected between the portion 39b and a fixed boss 30c on the cover 30a. The arrangement acts as a biasing means 38 to bias the reel 35 towards the opening 37. The portion 39b also serves to limit inward movement of the reel 35 along the axis of the slot 36 by engagement with the peripheral ribbon winding on the supply reel 34.

115 The cartridge 30 is slightly smaller and thinner than the cartridge 15. In the attached position of the cartridges, the openings 22 and 37 are aligned, as are the ports 23a and 23b and 33c and 33d.

120 The supply reels 19 and 34 have fixed axes of rotation and the take-up reels 20 and 35 have axes of rotation independently shiftable along the paths of slots 21 and 36, respectively.

125 The cartridge assembly 10 is intended to be mounted on the carrier 71 (Figs. 9 and 10) of a single element typewriter such as is described 130

and shown in the specification of our Letters Patent No. 1,436,668 or in the specification of our co-pending patent application No. 52013/77 (Serial No. 1,556,628).

5 The carrier 71 includes selection mechanism (not shown) to rotate and tilt a typing element 72 to select a character for printing, and printing mechanism (not shown) by which the element 72 is pivoted and moved
10 forward to strike a ribbon (not shown) against a sheet of paper (not shown) held by a platen 73 and thus make an imprint of the selected character.

The cartridge assembly 10 is locked into
15 place on the carriage 71 in a cartridge holder 75, which will be more fully described hereinafter, with the typing element 72 in the space between guides 18a and 18b and 33a and 33b (Fig. 1), which space is sufficient to allow
20 the typing element 72 to pass therebetween. Drive means operatively associated with the holder 75 can effect pivotation of the cartridge assembly 10 about an axis 11 (Fig. 2) so as to present different portions of the ribbon 12
25 or the ribbon 13 to the printing element 72. Additionally, the drive means provides for elevation of the ribbon 12 and effects advancement or feed of the ribbon between the supply and take-up spool so as to present new
30 ribbon portions to the typing element as typing proceeds. If the ribbon is a carbon ribbon 12a (Fig. 3a) where no strikeover is permitted, the motion of the cartridge assembly 10 will be to elevate the ribbon to a first
35 level 1, a character is printing ("A" in the drawing), the cartridge is then depressed and the ribbon advanced in the direction of the arrow a distance d, the cartridge is then elevated to permit printing at a second level 2,
40 and then depressed once again to permit the operator to view the printed character, and then advancement once again a distance d. The cartridge assembly is then elevated to a third level 3 where a third character will be
45 typed and then once again lowered or depressed and the ribbon advanced another increment d. It is evident, therefore, that the distance between adjacent indicia in a single horizontal row on the tape will be equal to
50 3d.

If the ribbon is a fabric ribbon 12b (Fig. 3b), where strikeover is permitted, it is useful to minimize ribbon waste and to permit maximum usage of the ribbon. Accordingly,
55 for example, nine imprints may occur for each incremental advancement of a distance in the direction of the arrow.

The distance incrementally advanced and the elevation of the tape to present the same at the print point is a matter of drive design. As the difference in both elevation and feed of the print ribbon depends upon the type of print ribbon used, coded means may be used on the cartridge assembly to control the
60 operation of the drive means in accordance
65

with the type of ribbon contained in the cartridge so that changes are automatically effective.

As described so far, the cartridge assembly 10 comprises two cartridges 15 and 30, the
70 cartridge 15 containing print ribbon 12, and the cartridge 30 containing erase tape ribbon 13 for use in a manner similar to that described in patent specification No. 1,316,534.

As the erase tape ribbon 13 is normally
75 used much less than the print ribbon 12, it is a particular advantage to have the cartridges separable so that they may be replaced individually as the ribbons are used up. However, the cartridge assembly could be unitary,
80 with a single cartridge having two chambers, one for each ribbon. Alternatively, the print ribbon containing cartridge could be used alone. Further the cartridge 30 could contain
85 print ribbon of a different colour, if the erase feature is replaced by a colour feature.

Pivotation of the cartridge assembly about the axis 11 is facilitated by a laterally extending trunnion 27 which projects from the case wall 16b along an axis approximately through
90 the centre of mass of the cartridge. At the other side of the case, projecting ears 28 on the case top cover 15a permit locking engagement with the cartridge holder 75 which is
95 pivotable to allow pivotation of the cartridge assembly about the axis 11.

The cartridge holder 75 (Fig. 9) has at one end 76, a bracket 77 which is mounted for rotation about a stud 78 on sub frame 71a of the carrier 71. The bracket 77 includes a
100 central portion 79 which projects inwardly of the carrier and has depending integral hinge pins 79a and 79b, on either side of the central portion 79. The pins 79a and 79b are dimensioned to fit into the apertures 28a and 28b
105 (Fig. 4) respectively, formed in the ears 28 on the case top cover 15a of the cartridge 15. Beyond the hinge pins 79a and 79b, the bracket 77 has bifurcated spaced apart clamp legs 80 and 81, respectively. The legs having
110 vertically spaced apart projecting finger portions 80a, 80b and 81a, 81b, respectively, which serve to embrace the projecting ears 28 to serve as a clamp and cam forcing the pins 79a and 79b into locking engagement
115 with the respective apertures 28a and 28b upon insertion of the cartridge 15 into the typewriter (Figs. 11, 12 and 13). Insertion of the ears 28 between the finger portions of the bifurcated legs 80 and 81 assist in aligning the apertures 28a and 28b with the hinge pins 79a and 79b respectively so that after entry of the cartridge, the trunnion end of the cartridge may be depressed as shown by the arrow in Fig. 12, permitting full engagement of the
120 hinge pins 79a and 79b into the apertures 28a and 28b and, due to the embracing action of the bifurcated legs 80 and 81, effecting capture of the cartridge 10 in the holder 75.

This is adequate to locate and anchor one 130

end of the cartridge. Whilst the trunnion 27 could be supported in an open trunnion plate, it is preferred to latch it to the other end 86 of the holder 75, so as to effect retention of the cartridge 15 while permitting pivotation about the axis 11. At the other end 86 (Figs. 9 and 10) is a fixed, upstanding trunnion plate 87 integral with a bracket 86a secured to the carrier 71. A bracket 88 is pivotally mounted on the bracket 86a by a pin 89 and biased to rotate about the pin in the direction of the arrow, counterclockwise, by an offset portion of a pivoted rod 90, which engages a slot 91 in the bracket 88, a spring 92 bearing against another offset portion of the rod 90. The bracket 88 is inhibited from such counterclockwise motion by a latch spring 93 secured at one end to the bracket 86a and adapted to engage at the other end a depending portion 94 of a piece 95 of the bracket 88. The spring 93 is positioned slightly higher than the 87a of the trunnion plate 87. Upon entry of the trunnion 27 into the plate 87, the latch spring 93 is depressed, releasing the bracket 88 for counterclockwise rotation of the bracket about the pin 89. The piece 95 acts as a trunnion box for the trunnion 27, capturing the trunnion within the trunnion plate 87.

To uncover the trunnion 27 when it is within the trunnion plate 87, the bracket 88 has a load button extension 96, manual depression of which causes clockwise rotation of the bracket 88 to permit removal of the trunnion 27 and reengagement of the latch spring 93.

The other off-set portion of the rod 90 has a further offset portion 90a which rides on an extension 77a (Fig. 9) of the bracket 77. The bracket 77 is biased against the portion 90a by a spring 97. Depression of the load button extension 96 rotates the rod 90 to pivot the bracket 77 about the pivot 78 against the bias of the spring 97. The latch spring 93 in engagement with the bracket 88 holds the rod 90 in this position.

Release of the latch spring 93 from the bracket 88 by the trunnion 27 striking it, releases the rod 90 and offset portion 90a, so that the bracket 77 rotates about the pivot 78 under the biasing action of the spring 97. This causes rotation of the cartridge assembly 10 in the direction of the arrow 78a (Fig. 13) about the pivot 78 to place the cartridge assembly in a home or first position relative to the print element 72.

After the cartridge 15 or the cartridge assembly 10 has been inserted in the cartridge holder, and the cartridge tilted to its home or first position by the spring 97, the typewriter is ready for operation. The means for shifting the drive mechanism so that the ribbon elevation or lift and the ribbon feed are different depending upon the type of ribbon to be used in the cartridge 15, will be described more completely hereinafter.

The selection mechanism for the typewriter is substantially as disclosed in the specification of our co-pending patent application No. 52013/77 (Serial No. 1,556,628). A print shaft 100 (Fig. 14) causes rotation through gearing 99 of a second shaft 99a to cause rotation of barrel cams 98 which effect both rotation and tilting of the printing element 72 and thereafter printing is effected by striking the element 72 against the print ribbon on paper carried by the platen. The print shaft 100 is caused to rotate in a conventional manner such as that disclosed in our Patent Specification No. 1,436,668.

In order to effect both lift and feed of the ribbon to place the ribbon between the typing element 72 and the paper on the platen, a gear 101 is mounted on the print shaft 100 and disposed in driving relation to a gear 102 (Fig. 15) mounted on a shaft 103 which is mounted on the carrier 71. The gear ratio between gears 101 and 102 is such that one rotation of the print shaft 100 serves to move the gear 102 one ninth of a revolution. The ratio is only by way of example and other ratios may be chosen depending upon the function desired.

Mounted on the gear 102 is a multiple cam 110 having four superposed cam tracks 111, 112, 113 and 114, whose peripheries are laid out in profile in Fig. 17. Cams 111 and 112 are alternatively effective to control the ribbon in the cartridge, depending upon the vertical position of a cam follower 115. Cams 113 and 114 are alternatively effective to control lift for the cartridge, depending upon the vertical position of a cam follower 150. The cam followers 115 and 150 are held in the bifurcated ends of shift fork arms 164 and 165, respectively. The arms 164 and 165 are connected together and pivoted on a pivot pin 166. When cam follower 115 is in contact with cam 111 (as shown), cam follower 150 is in contact with cam 114. When cam follower 115 is in contact with cam 112, cam follower 150 is in contact with cam 113. With the cam follower 115 on the cam 111, the follower 115 rides over the cam 111 from lobe 1 to lobe 2 (Fig. 17) during one revolution of the print shaft 100. Ribbon feed is caused by the cam follower rising up the slope of the lobe and amounts to distance d (Fig. 3a). The follower 115 is mounted on one end of a link 116 pivoted on a pivot pin 117 and connected to the other end of link 116 is a push rod 118 which is coupled to a ribbon drive means, consisting of a spiked ribbon driver 120 (Fig. 16), by a ratchet lever 119 through a one-way coupling. This causes angular rotation of the spiked driver 120 in one direction upon movement of the link 118 to the left (Fig. 16). The spiked driver 120 (Fig. 19) is mounted for rotation on a shaft 120a in the central portion 79 of the bracket 77. The bracket 77 includes a lower stabilizer portion 121 which underlies

a portion of the cartridge assembly and, in conjunction with the pins 79a and 79b and the bifurcated legs 80 and 81 ensures good cooperation of the spike driver with the ribbon advancing surface 20a of the take-up reel 20 through the opening 22 (Fig. 4). Thus as the cam follower 115 follows each of the lobes 1 to 9, the spiked driver increments the ribbon one distance "d" for each revolution of the print shaft 100.

The cam follower 150 is slidable on a post 151 at one end of a link 152 which is pivoted on pivot pin 153 to the carrier 71. The other end of the link 152 is connected through lift linkage 154 pivoted at 155 and 156 to a yoke 157 having arms 158 and 159 which underlie the guides 18a and 18b of the cartridge 15. Thus the mechanism can be used without the cartridge 30. As the cam follower 150 follows the cam 114 (Fig. 17) during three successive revolutions of shaft 100, it rides over three adjacent lobes of differing heights. This produces three different angular movements of link 152 and three different pivotal movements of yoke 157, so that the cartridge is lifted to present the ribbon to the print element successively at the three levels, 1, 2 and 3 shown in Fig. 3a. This is repeated three times for each revolution of cam 110.

If the cartridge contains a fabric ribbon, so that the movement illustrated in Fig. 3b is desirable, the shift fork arms 164 and 165 are pivoted about the pin 166 and the cam followers 115 and 150 ride on the cams 112 and 113 respectively. The profile of the cam 112 has only one drop. During nine successive revolutions of shaft 100, the cam follower 115 rides over the profile of the cam 112 (Fig. 17) and increments the ribbon only once for a distance S. Each of the lobes on the profile of the cam 113 is of a different height. During nine successive revolutions of shaft 100, the cam follower 150 is lifted to nine successively lower levels, so that the ribbon is presented to the print element in the manner illustrated in Fig. 3b.

Printing occurs during the dwell of ribbon feed and ribbon lift as exemplified by the lines 210 (Fig. 17).

The shifting of the cam followers 115 and 150 from the cams 111 and 114 to the cams 112 and 113 and vice versa, is preferably controlled automatically by the cartridge, depending upon which kind of cartridge is installed in the typewriter. For this purpose, the cartridge 15 has a lobe in the vicinity of the trunnion 27.

As shown in dotted lines in Fig. 4, the lobe may be a forward lobe F or a rearward lobe R. If the lobe R is present, the feed and lift pattern will be shown in Fig. 3a, while if the lobe F is present, the feed pattern and lift pattern will be as shown in Fig. 3b.

The mechanism includes a lobe engaging yoke 160 (Fig. 9) having an opening 161

therein, and located in sliding engagement with the trunnion plate 87. The yoke 160 has a depending portion 162 by which it is pivoted to the bracket 86a (Fig. 10) about a pin 162a. The yoke 160 has a lateral extension 163 which is integral with the shift fork arms 164 and 165. If a cartridge 15 with a rearward lobe R is inserted, the lobe enters the yoke 160 as the trunnion 27 enters the trunnion plate 27. The lobe R enters the opening 161 and causes the yoke 160 to move to the rear (Fig. 9). This pivots the shift fork arms 164 and 165 to lift the cam follower 115 and depress the cam follower 150 to engage the cam 111 and cam 114, respectively.

If a cartridge 15 with a forward lobe F is inserted, the lobe enters the opening 161 and causes the yoke 160 to move forward. This pivots the shift fork arms 164 and 165 to depress the cam follower 115 and lift the cam follower 150 to engage the cam 112 and cam 113, respectively.

Erase Function

When an error has been made, it is desirable to elevate the cartridge assembly 10 to a position wherein the erase tape ribbon 13 in the cartridge 30 lies between the typing element 72 and the paper on the platen. Mounted on the print shaft 100 (Figs. 14 and 15) is a double cam 175 having a ribbon feed cam track 176 and a ribbon lift cam track 177. A pivoted cam follower 178 has its one end aligned with the feed cam track 176 and its other end connected by link 180 to a bracket 181 pivoted on the shaft 120a. The bracket 181 has a ratchet engagement with a spike driver 182 to convey motion thereto in one direction only for feed of the erase tape ribbon 13. The bracket 181 is under the bias of a tension spring 181a which tends to pull on the link 180 to pivot the cam follower 178 so that its one end engages the cam track 176. To prevent this, except when erasure is desired, the cam follower 178 has an extension 178a (Fig. 15) engaged by an inhibitor stop 185, which holds the follower 178 clear of the cam track 176. The inhibitor stop 185 is part of an erase actuator and is depressible by operation of a solenoid 187. Depression of the stop 185 frees the cam follower 178 for pivotation so that its one end engages the cam track 176. Subsequent rotation of shaft 100 causes the one end of the cam follower 178 to follow the profile of the cam track 176 (Fig. 18). Initially, the cam follower 178 is pivoted by the spring 181a against the high portion of the cam track 176. Rotation of the cam 175 by the shaft 100 causes the cam follower 178 to pivot further allowing the bracket 181 to rotate relative to the spike driver 182 due to the one-way connection therebetween. Further rotation causes the cam follower to be pivoted part way back to the high portion of the cam track, causing drive

of the spike driver 182 by the engagement with the bracket 181. Later during rotation, the cam follower is pivoted the whole way back to the high portion of the cam track, causing further drive of the spike driver 182. One step of ribbon feed by the spike driver 182 is accomplished in two halves. Print movement of the print head which effects erasure occurs during the dwell between the two halves of ribbon feed as exemplified by the line 202 (Fig. 18). When the erasure is complete, the solenoid 187 is released and the inhibitor stop 185 returns, pushing the extension 178a so as to withdraw the cam follower from the cam track 176.

A pivoted cam follower 179 (Fig. 15), of bell crank form, has its one end held normally radially clear of the cam track 177 by engagement with the bifurcated end of an arm 186 of the erase actuator mechanism. The other end of the cam follower 179 is connected by a link 188 to lift linkage 154. The one end of the cam follower 179 is thus able to follow the movements of the linkage 154 under the influence of the link 152 and cam follower 150, without engaging the cam track 177.

Upon operation of the solenoid 187, the arm 186 is depressed, along with the stop 185, and places the one end of the cam follower 179 in alignment with the cam track 177. Subsequent rotation of the shaft 100 and cam 175 causes pivotation of the cam follower 179 as it follows the profile of the cam track 177 (Fig. 18). As the cam follower 179 rises to the high portion of the cam track 177, the link 188 is pulled and pushes the linkage 154 to lift the yoke 157. This positions the erase tape ribbon 13 in the cartridge 30 between the print head 72 and the platen 73, so that printing movement of the print head enables a previously printed character to be erased by lift-off. There is a lost motion connection between the link 152 and the linkage 154 to allow for such additional lift.

This application is divided out of application No. 16573/78 (Serial No. 1,585,245) in which is claimed a typewriter ribbon cartridge assembly having a pair of superposed chambers, each chamber having separate ribbon supply and ribbon take-up spools, and a pair of spaced apart ribbon guides in a ribbon path between the spools, each supply spool having a fixed axis of rotation, and each take-up spool having an axis of rotation movable along a path towards an access opening in the respective chamber and biased towards the opening.

In application No. 7909115 (Serial No. 1,585,246) also divided out of that application is claimed a typewriter ribbon lift mechanism for a cartridge having two ribbons therein, comprising a cyclically operable print shaft, a lift yoke for the cartridge, a cam driven from the print shaft, a cam follower means interconnecting the cam and

the lift yoke to effect ribbon lift upon drive of the cam by the print shaft, another cam driven from the print shaft, another cam follower means interconnecting the other cam and the lift yoke, means normally to prevent ribbon lift upon drive of the other cam from the print shaft, and selectively operable means to disable the ribbon lift prevention means to enable the other cam follower means to effect ribbon lift upon drive of the other cam from the print shaft.

In application No. 7909117 (Serial No. 1,585,248) also divided out of that application is claimed a typewriter ribbon cartridge mounting mechanism comprising cartridge clamping means to receive a trunnion on the other end of a ribbon cartridge, and a trunnion plate movable to capture a trunnion in the trunnion box, the clamping means being pivotable about an axis aligned with the axis of a trunnion in the trunnion box.

In application No. 7909118 (Serial No. 1,585,249) also divided out of that application is claimed a typewriter ribbon cartridge adapted for use in a mounting mechanism comprising cartridge clamping means to engage and locate formations on one end of a ribbon cartridge, a trunnion box spaced from the clamping means to receive a trunnion on the other end of a ribbon cartridge, and a trunnion plate movable to capture a trunnion in the trunnion box, the clamping means being pivotable about an axis aligned with the axis of a trunnion in the trunnion box, comprising means to hold a supply of ribbon in a ribbon path part of which is external to the cartridge, a trunnion projecting from the cartridge at one end along an axis, and formations at the other end for engagement by the clamping means, so as to permit pivotations of the cartridge about the axis.

In application No. 7935180 (Serial No. 1,585,250) also divided out of that application is claimed a typewriter ribbon cartridge comprising a chamber, a supply of ribbon in the chamber, and extending in a ribbon path having a part external to the chamber to a take-up spool, an opening in a side wall of the chamber exposing a ribbon advancing surface of the ribbon on the take-up spool for engagement by a ribbon advancing mechanism and biasing means for biasing the take-up spool towards the opening.

WHAT WE CLAIM IS:—

1. A typewriter ribbon feed mechanism for a cartridge having two ribbons therein with superposed surfaces of the ribbons exposed therethrough, comprising a cyclically operable print shaft, separate superposed feed drivers for the ribbons on a substantially common axis, a first cam driven from the print shaft, a first cam follower interconnecting the first cam and one of the ribbon

- feed drives to effect ribbon feed upon drive of the first cam by the print shaft, a second cam driven from the print shaft, a second cam follower interconnecting the second cam and the other ribbon feed drive, means normally to prevent ribbon feed upon drive of the second cam from the print shaft, and selectively operable means to disable the ribbon feed prevention means to enable the second cam follower means to effect ribbon feed upon drive of the second cam from the print shaft.
- 5 2. Mechanism according to claim 1, in which the ribbon feed prevention means comprises means to disengage the second cam follower means from the second cam.
- 10 3. Mechanism according to claim 1 or 2, in which the first cam has two tracks for the first cam follower means and selectively operable means engages the first cam follower means with one or other of the two tracks to effect different ribbon feeds.
- 15 4. Mechanism according to claim 3, in which the selectively operable means for the first cam follower means is operable by means on the cartridge.
- 20 5. Mechanism according to claim 1, 2, 3 or 4, including a third cam driven from the print shaft, a third cam follower means interconnecting the third cam and a ribbon lift mechanism to effect ribbon lift upon drive of the third cam by the print shaft. 30
6. Mechanism according to claim 5, in which the third cam has a track with different rises to provide successively different ribbon lifts. 35
7. Mechanism according to claim 5 or 6, including a fourth cam driven from the print shaft, a fourth cam follower means interconnecting the fourth cam and the ribbon lift mechanism, means normally to prevent ribbon lift upon drive of the fourth cam from the print shaft, and selectively operable means to disable the ribbon lift prevention means to enable the fourth cam follower means to effect ribbon lift upon drive of the fourth cam by the print shaft. 40 45
8. Mechanism according to claim 7, in which the ribbon lift prevention means comprises means to disengage the fourth cam follower means from the fourth cam. 50
9. A typewriter ribbon feed mechanism, substantially as hereinbefore particularly described with reference to Figures 14 to 19 of the accompanying drawings.
- RICHARD C. PETERSEN,
Chartered Patent Agent,
Agent for the Applicants.

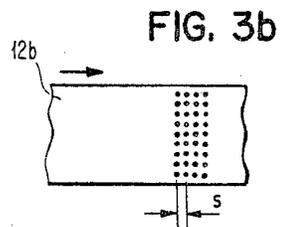
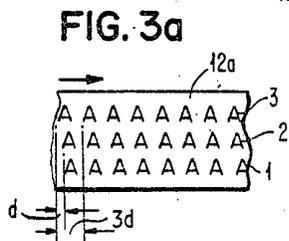
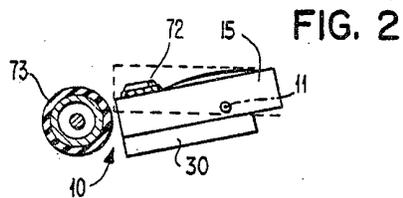
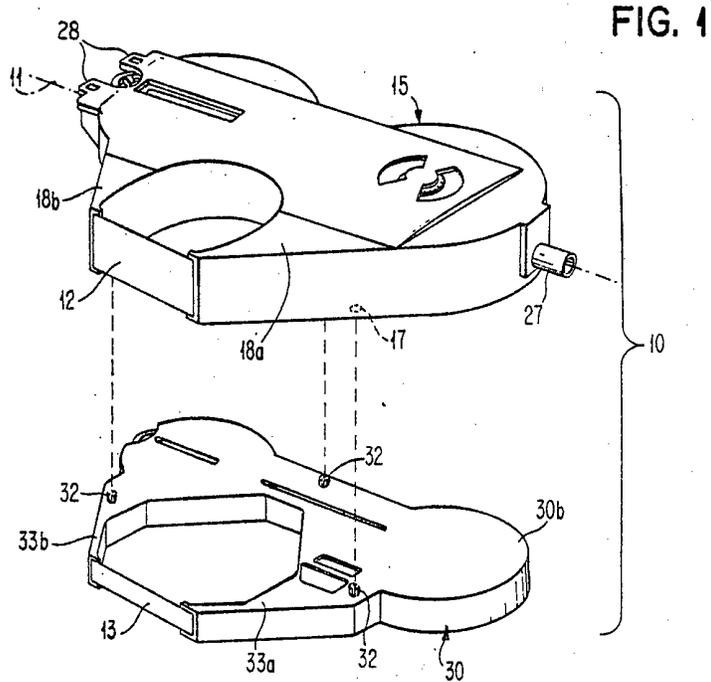


FIG. 5

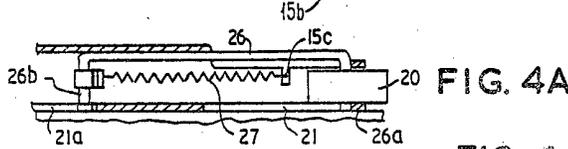
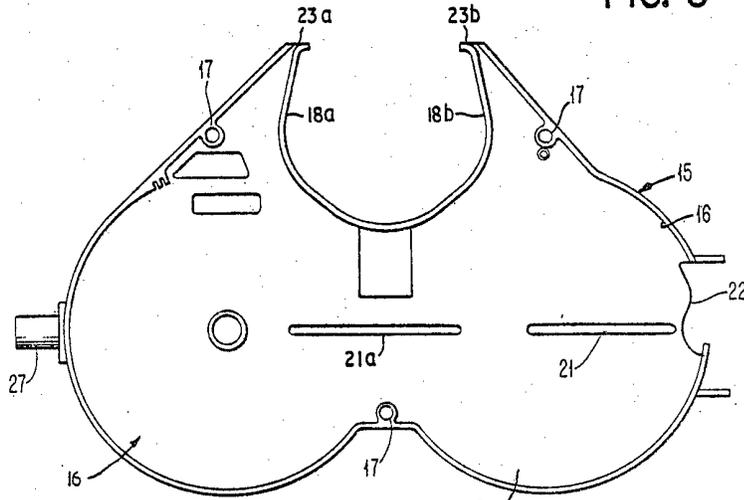


FIG. 4A

FIG. 4

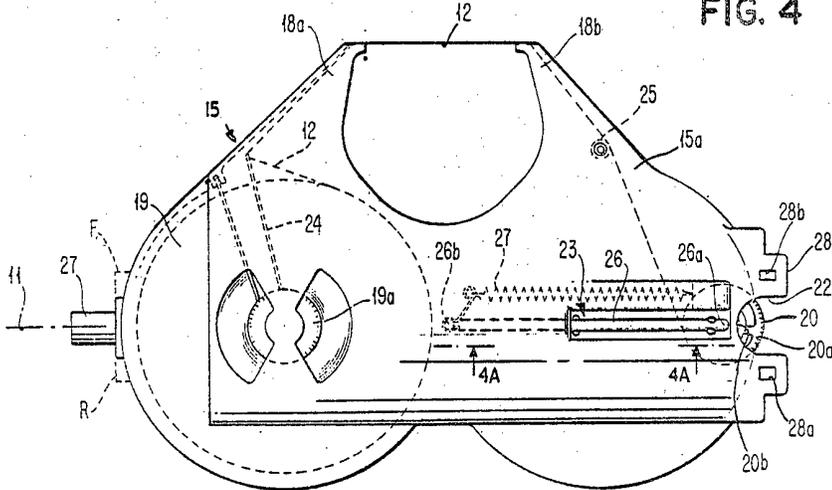


FIG. 7

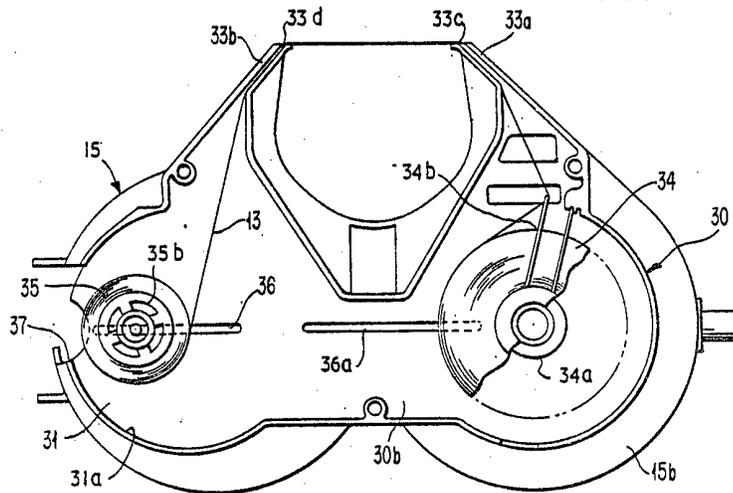


FIG. 8

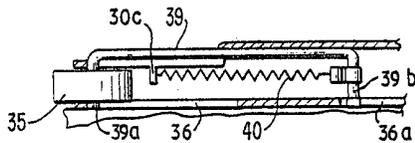
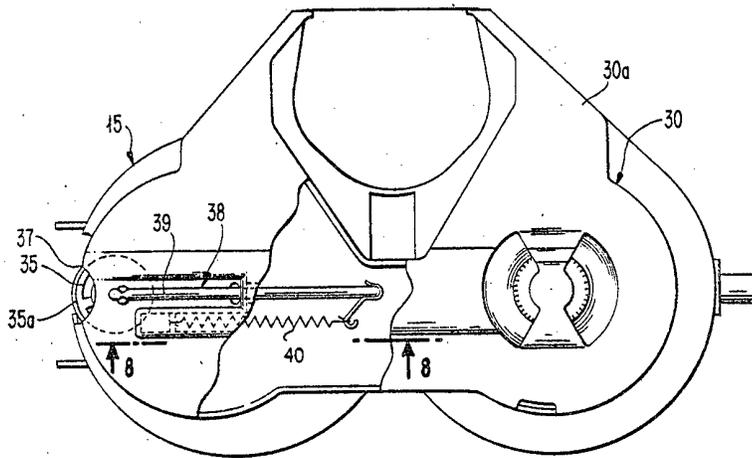


FIG. 6



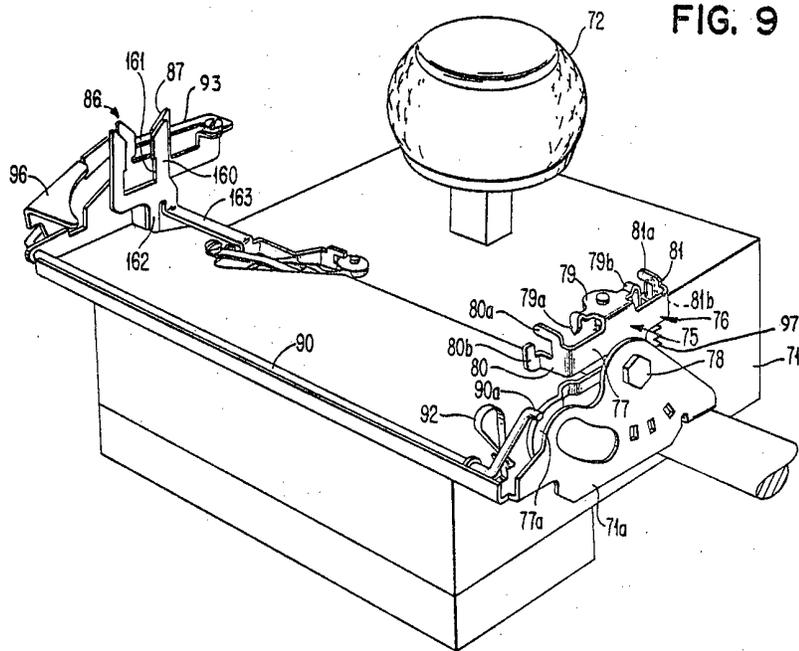


FIG. 10

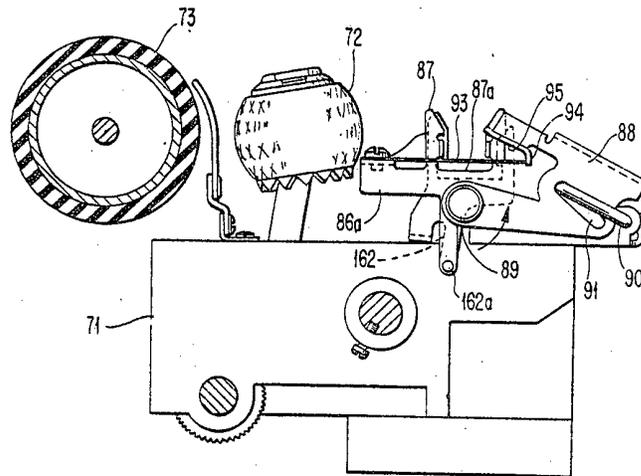


FIG. 12

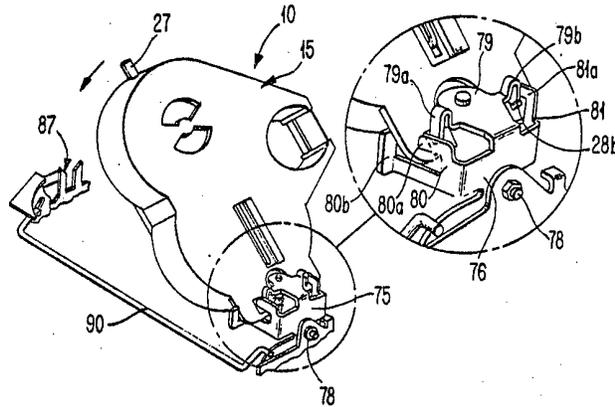


FIG. 13

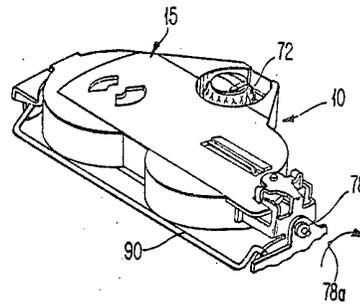


FIG. 11

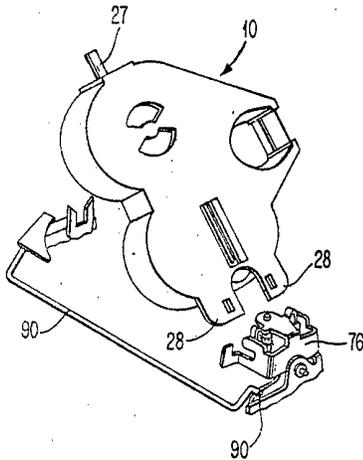


FIG. 14

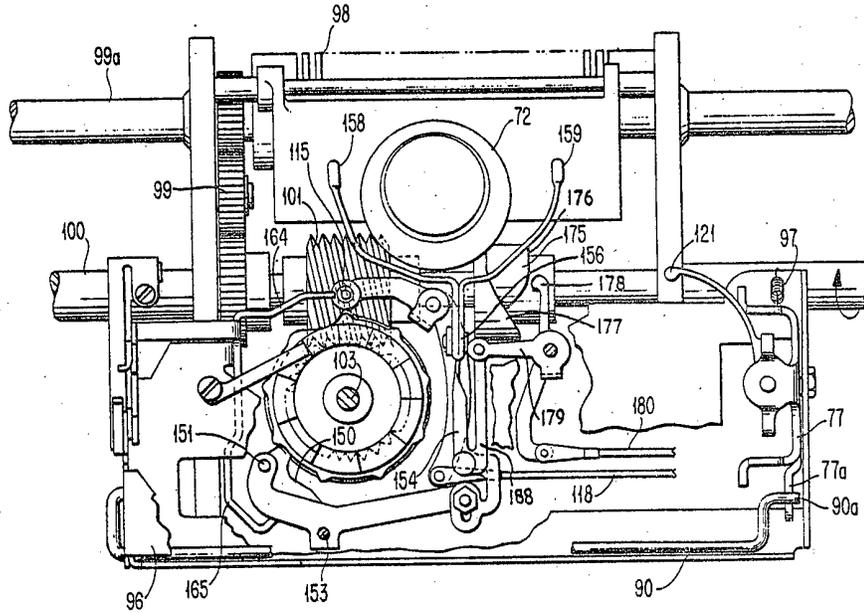


FIG. 15

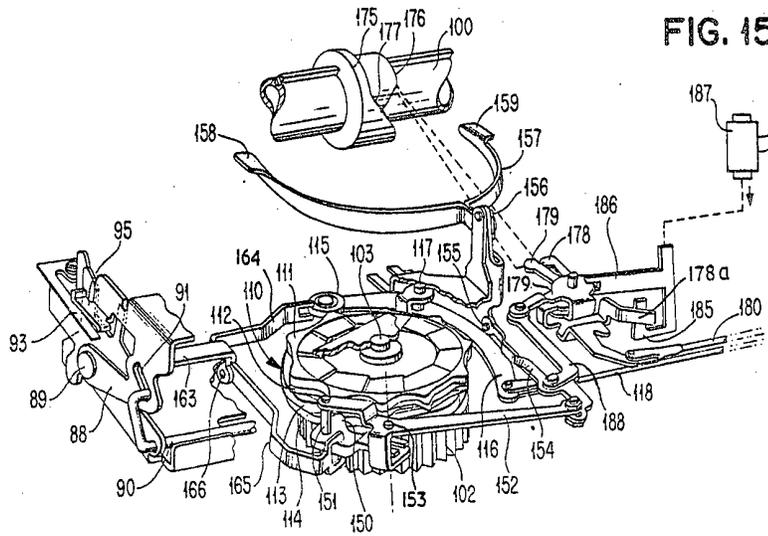


FIG. 16

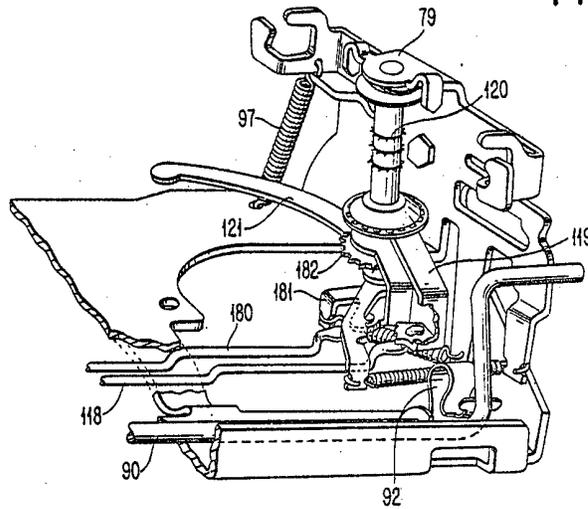


FIG. 17

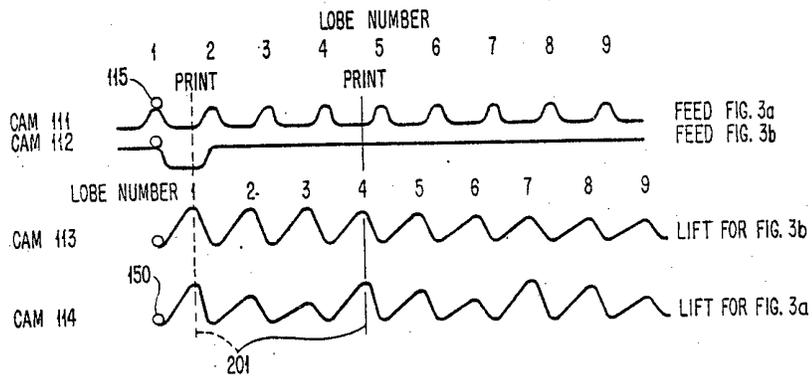
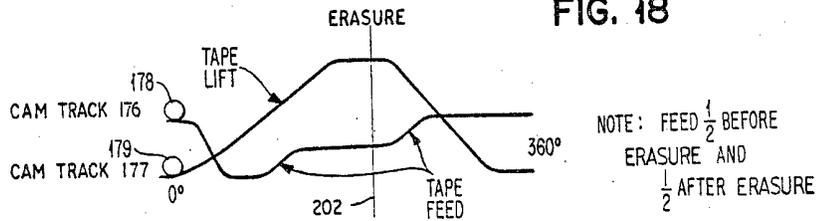


FIG. 18



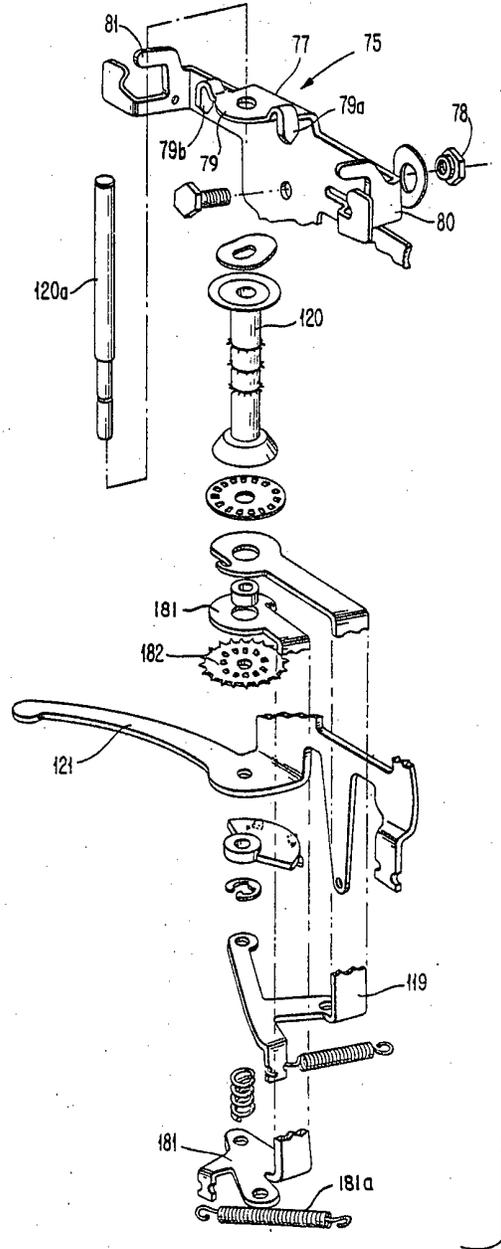


FIG. 19