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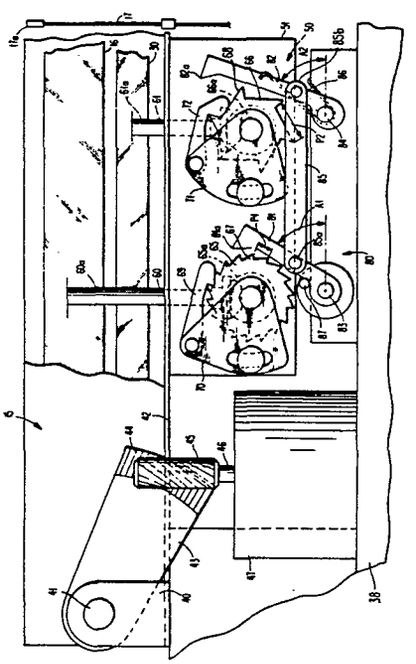
(54) Improved ribbon feed and lift mechanism for a typewriter.

(57) In a daisy wheel (17) or rotary print wheel typewriter, a single motor (47) (stepper motor) is employed to accomplish both ribbon lift and feed for typewriter ribbon (16) and correction ribbon (30) loaded in a cartridge assembly (15). A single motor drive moves a cartridge assembly support about an axis (41) to present either the typewriter ribbon or the correction ribbon to the print point at the print line. In the first portion of the arc that the cartridge assembly moves up for normal typing with the typewriter ribbon, only the feed ratched (65) for the typewriter ribbon is engaged into drive pawl (81). Alternatively, when the rotation is greater, to present a correction ribbon at the print line, the added elevation of the cartridge assembly causes the correction ribbon ratchet (66) with drive pawl (82) together with disengagement of the ratchet (65) from pawl (81) through camming effect due to ratchet (66), pawl (82) and link (85). When the cartridge assembly is brought back down about axis (41), the only pawl engaged ratchet is driven thus driving the corresponding ribbon by one feed increment.



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IMPROVED RIBBON FEED AND LIFT MECHANISM FOR A TYPEWRITER

Description

Technical Field

The present invention relates to typewriters and more specifically relates to improved ribbon feed and cartridge lift mechanisms for presenting different portions of a typewriter ribbon or a correction ribbon to a print point along a print line of a typewriter and automatic feeding of the ribbon dependent upon the cartridge elevation.

Background of the Invention

There are numerous instances in the prior art of typewriter ribbon as well as correction ribbon feed which are coupled to mechanism for elevating or presenting different portions of typewriter ribbons as well as correction ribbons to a print line. For example, see French Patent No. 78.10339, filed March 31, 1978, (Publication No. 2391853) which discloses a typewriter ribbon cartridge assembly including typewriter ribbon and correction ribbon in which separate drives are employed for elevating and depressing the cartridge assembly to present ribbon at the print point, and for feeding the ribbon, depending upon whether it's print ribbon or correction ribbon, the dependence being upon the elevation of the cartridge about its supporting platform.

Other art is U. S. Patent 4,111,293, issued on September 5, 1978 and U. S. Patent 710,144, issued on September 30, 1902. The '293 patent does illustrate a single cartridge and reciprocation of the cartridge to present ribbon at the print point but utilizes a double motor drive, that is one motor for advancing the ribbon and a second solenoid motor

for actuating and effecting the ribbon lift. In the present instance, as will be more completely explained hereinafter, both ribbon lift and drive are accomplished by a single drive motor. The '144 patent, alternatively, discloses a date stamp operation mechanism in which a hand lever having a pair of pawls may be put into one of two positions, first to actuate one ratchet and then a second ratchet.

Brief Description of the Present Invention

The invention contemplates for providing, in a typewriter having provisions for receiving a typewriter print ribbon cartridge and a correction ribbon cartridge in superimposed relation to form a cartridge assembly, each of the cartridges including separate ribbon advancing means therein for moving respectively print ribbon and correction ribbon; cartridge assembly support means providing support therefore, and drive means for reciprocating the support means for presenting selectively different portions of the ribbons to a print point along a print line, only the respective ribbon being advanced which is presented to the print point, a ribbon feed and lift mechanism including: first and second, spaced apart ratchets, each having ratchet teeth thereon, said second ratchet having ratchet teeth with a greater pitch than the pitch of the first ratchet said ratchets being connected respectively to respective ones of the ribbon advancing means; first and second drive pawl means mounted on the typewriter for engaging respectively the first and second ratchets during reciprocation thereof; and link means interconnecting the drive pawl means so that upon reciprocation of said support means a distance equal to or greather than the pitch of the teeth of the first ratchet but less than the pitch of the teeth of the second ratchet, only the first ratchet moves due to the engagement of the first pawl with the first ratchet, and the second drive pawl means being

positioned so that upon reciprocation of the support means exceeding the pitch of the teeth of said second ratchet, the second pawl means effects movement of said second ratchet.

Brief Description of the Figures

FIG. 1 is a perspective view of a typical typewriter of the single element type, specifically a rotary print wheel typewriting apparatus which is constructed in accordance with the present invention.

FIG. 2 is an enlarged fragmentary plan view of a typical cartridge assembly which may be employed with the apparatus of the present invention.

FIG. 3 is a fragmentary sectional side elevational view of the apparatus of a preferred embodiment of the present invention and illustrating both the ribbon lift and ribbon advance features of the present invention as with a cartridge of the type illustrated in FIG. 2.

FIGS. 4 and 5 are schematic representations of a portion of the apparatus illustrated in FIG. 3 and showing how the typing ribbon and the correction ribbon may be driven.

FIG. 6 is a fragmentary sectional side elevational view of another embodiment of the apparatus of the present invention and illustrating both the ribbon lift and ribbon advance features of the present invention as with a cartridge of the type illustrated in FIG. 2.

FIG. 7 is a fragmentary enlarged plan view taken along line 4-4 of FIG. 6.

FIGS. 8-10 are enlarged schematic representations of a portion of the apparatus illustrated in FIGS. 6 and 7 and showing how the typing ribbon and the correction ribbon may be driven.

FIG. 11 is a fragmentary enlarged side elevational view similar to FIG. 6 but showing a modified version of mechanism constructed in accordance with the present invention.

FIGS. 12 and 13 are fragmentary sectional views taken along lines 9,10 - 9,10 of FIG. 11 to illustrate both print ribbon and correction ribbon advance or feed.

FIG. 14 is a schematic circuit diagram illustrating a typical circuit means by which ribbon lift and feed may be accomplished.

Detailed Description of Preferred Embodiments

Turning now to the drawings, and especially FIG. 1 thereof, a typical typewriter 10 including a keyboard 11, frame 12 and paper receiving platen 13 are illustrated therein. Nested within the portion adjacent to platen 13 is a cartridge assembly 15 which includes at least a typewriter ribbon or the like 16 which passes exteriorally of the cartridge 15 intermediate the platen 13 and, in the illustrated instance, a print wheel or the like 17. The print wheel construction is similar to that found in many state of the art typewriters, and may typically be of the construction illustrated in U. S. Patent 3,859,712. Typewriters of this type (single element type) typically mount the ribbon feed and lift on a carrier which translates between left and right margins associated with the platen along a print line.

A typical ribbon cartridge assembly 15 is illustrated in FIG. 2, and includes a casing 18 having a print ribbon supply spool 19 for providing print ribbon 17 through an opening 20 externally of the casing 18. As illustrated, the print ribbon 16 traverses a recessed portion 21 in the casing 18 which provides an opening for the print wheel 17, the ribbon 16 entering a second aperture or opening 21a and being supplied to a take up spool 22. The take up spool 22 is biased against an internally and rotatably mounted spiked wheel driver 23 as by a biasing spring 24 which serves to bias a rod 25 which is captured at one end 26 by the take up spool 22 effectively pressing the take up spool 22 against the spiked driver 23. In this manner, as the spiked driver 23 rotates, the take up spool 22 becomes larger biasing the spring 24 but allowing for uniform increments of ribbon feed. Moreover, the diameter of the spiked driver 23 may be changed depending upon the type of ribbon 16 being employed with the particular cartridge. For example, with a standard carbon type ribbon, no overlap between adjacent characters being printed is permissible and the feed rate of the ribbon as typing or printing progresses must be, in effect, greater than if the cartridge houses a multi-strike ribbon.

Immediately below the casing 18 is a second cartridge which may snap together to form the cartridge assembly 15 or, in the alternative may be incorporated as part of the cartridge to make the cartridge assembly. In either instance, (and for purposes of this application it is immaterial which form is desired), the second portion of the cartridge assembly 15 includes a second ribbon, in the preferred embodiment a correction ribbon 30 which may include lift off or cover-up type material. The correction ribbon 30 is wound upon a supply spool 31, and extends through the opening 20 (or alike in putting on a separate cartridge) and then proceeds through the opening 21a to a correction ribbon 30 take-up spool 32. The

correction ribbon 30 is biased in a similar manner to the print ribbon 16 as by a rod 33, which biases a spring 34 against a second spiked wheel driver 35, rotatably mounted within the cartridge assembly 15. A typical way in which the cartridges may be snapped together, if separate cartridges are desired to make up the cartridge assembly 15, is illustrated in the French Patent 78.10339, heretofore mentioned.

In accordance with the invention, novel means are provided for supporting the cartridge assembly 15 and reciprocating or oscillating the assembly between a home position to permit typist visibility of the print line, and an elevated position to present a portion of the print ribbon 16 intermediate the wheel 17 and the platen 13 of the typewriter, and for selectively feeding or incrementing either one of ribbon 16 or 30 depending upon the elevation of the cartridge assembly 15, without effecting feeding of the other of the ribbons. To this end, and referring first to FIG. 3, the carrier 38 mounts thereon the implements of printing including the print wheel 17 and its associated drive (not shown) as well as the cartridge assembly 15 and its drive. As illustrated, the carrier includes upstanding posts or brackets 40 through which is journaled an axle 41 and a depending cartridge support means or platform 42. Connected to the axle 41 is an extending gear segment 43 which includes teeth 44 on the extended terminal end thereof. The teeth 44 mesh with a pinion gear 45 which is connected to the shaft 46 of drive means, in the illustrated instance and preferred embodiment, a stepping motor 47. Inasmuch as the gear segment 43 is connected to the axle 41 which is connected in turn to the support 42, it is easy to see the rotation of the stepping motor will effect elevation or rotation of the cartridge support platform 42 about the brackets 40 presenting one or the other of the ribbon 16 and 30 to and in front of the printing portion (print petal 17a) of the print wheel 17, depending upon the steps of the motor,

and the gear ratio between the segment gear 43 and the pinion gear 45, as well as the number of steps per revolution of the stepping motor 47.

In order to position the new or fresh ribbon portion (print ribbon 16 or correction ribbon 30) intermediate the petal 17a on the print wheel 17 and the platen 13, ribbon drive means 50, dependent upon the distance of the reciprocation of the cartridge assembly 15 about the axle 41, effect independent driving of the print ribbon 16 and correction ribbon 30. To this end, the ribbon drive means 50 includes a bracket means or housing 51 which is connected to and depends from the cartridge assembly support means or platform 42 so as to effect reciprocation or oscillation of the housing 51 as the platform 42 reciprocates. Interiorally of the housing 51 are first and second ratchet members 65 and 66 respectively, the rachet member 65 being, as through beveled gears 65a, connected to an upstanding shaft 60 which projects through the cartridge assembly support means 42 and terminates in a spline like end 60a for coupling to the spiked driver 23. In a like manner, the ratchet member 66 is connected through bevel gears 66a to a second upstanding pin 61 which also terminates in a spline like end 61a for coupling to the spiked driver 35. As shown, the ratchet members 65 and 66 include radially projecting and circumferentially extending teeth 67 and 68 respectively, the pitch P1 of the teeth 67 being less than the pitch P2 of the teeth 68. Moreover, mounted interiorally of the housing for engagement respectively with the ratchet member 65 and 66 are back-check pawl means 69 and 72, the back-check pawl means 69 being mounted on an adjustable bracket 70, while the back-check pawl means 72 being mounted on an adjustable bracket 71. The back-check pawl means 69 and 72 operate in a conventional manner to inhibit, in the illustrated instance, clockwise rotation of the rachet members 65 and 66.

Referring now to FIGS. 3, 4 and 5, in order to drive the ratchet members 65 and 66 during oscillation or reciprocation of the platform 42 about the axle 41, (which forms an axis for the cartridge assembly 15), and more specifically to drive the ratchets only upon a predetermined throw of the platform 42 about the axis of the axle 41, drive pawl means 80, in the illustrated instance two such pawls 81 and 82 having ratchet teeth engaging means 81a and 82a respectively thereon, are each pivotally connected to the carrier 18 as by pivot pins 83 and 84. As illustrated, the drive pawls 81 and 82 are interconnected as by a link 85 with pivot pins 85a and 85b connecting respectively the drive pawls 81 and 82. In this manner, as one of the pawls engages the respective ratchet member, motion of that pawl about its associated pivot 83 or 84 will be transmitted by way of the link 85 to the other of the drive pawls. Moreover, a bias spring 86 tends to bias the drive pawls 81 and 82 towards their respective ratchet members 65 and 66.

In order to inhibit rubbing of the drive pawls 81 and 82 against the ratchets 65 and 66 respectively, due to the spring pressure 86 effecting such rotation of the drive pawls about their pivots 83 and 84, an adjustable pawl stop member 87 limits the rotation of the drive pawl 81, and because of the coupling between the drive pawls as by the link 85, drive pawl 82 is stopped in a like manner from excessive rotation.

In operation, as the cartridge assembly support means or platform 42 is rotated about the axle 41 to present the print ribbon 16 opposite the print petal 17a of the print wheel 17, the housing 51 moves upwardly with the platform until the ratchet engaging means 81a comes into engagement with the teeth 67 of the ratchet 65. As the platform 42 descends due to the reversal of rotation of the stepping motor 47, the engagement of the ratchet

engaging means 81a or projection 81a of the drive pawl 81 effects counterclockwise rotation of the ratchet 65 allowing the spiked driver 23 associated with the typing ribbon 16 to be advanced. The pitch of the teeth 67 on ratchet 65 is such that a full segment of the arc of travel of the platform is essential in order to allow the ratchet teeth 67 of the ratchet 65 to be engaged by the ratchet engaging means or projection 81a of the pawl 81. In this manner, the typing ribbon may be for example, correctable film ribbon or may be the well known multi-strike ribbon so that numerous characters or indicia may be printed before the ribbon spiked driver 23 effects feeding of the ribbon 16. Thus the pitch of the teeth 67 must be sufficient to permit typing to incur on any part of the ribbon until the lowermost point of the ribbon is opposite the print petal 17a (or any other desired portion) in order to effect feeding of the typewriter ribbon 16. Thus it is preferable that a full segment of arc equivalent to the width of the ribbon 16 (or at least the distance from the highest to the lowest typing track) be achieved before the drive pawl 81 engages the ratchet and rotation of the ratchet 65 occurs. Another way of looking at the relationship between the drive pawl 81 and the teeth 67 of ratchet 65 is that upon reciprocation of the support means a distance equal to or greater than the pitch P1 but less than the pitch P2, the drive pawl 81 will engage a tooth of the typewriter ribbon ratchet 65 causing ribbon 16 to advance.

Drive pawl 82 is longer or extends further into the housing 51 than drive pawl 81, the reason for which will become more clear hereinafter. During the normal printing cycle wherein the typing ribbon 16 is presented opposite the type petal 17a for normal printing, the ratchet engaging means or projection 82a of pawl 82 does not engage the teeth 68 of ratchet 66 inasmuch as the throw of the housing 51 is insufficient to cause such engagement.

However, when it is desired to place the correction ribbon 30 opposite the print petal 17a, the platform 42 of necessity must be raised higher about pivot axis 41, the length of the movement being such that the projection 82a of the drive pawl 82 engages, upon depression of the platform 42 with a tooth 68 of the ratchet 66, further depression causing counterclockwise rotation of the ratchet 66. Due to the mechanical advantage of pawl 82 being at a steeper vertical angle than pawl 81 (i.e., A1 < A2), the pawl 82 will be cammed to the right or clockwise about its pivot 84 by engagement of a tooth 68 of the ratchet 66, and because of the link 85 interconnecting the drive pawls 81 and 82, drive pawl 81 will also be rotated clockwise inhibiting engagement of its ratchet engaging projection 81a with the teeth 67 of the ratchet 65. In this manner, during a correction cycle, drive pawl 81 is pulled away from the ratchet 65 and no typing ribbon 16 is fed. It should be noted that the platform or support means 42 movement is such that at the pawl 82, displacement is greater than the pitch P2 of the teeth 68 of the ratchet 66. Additionally, the result is enhanced by the outside diameter (tooth-tip to tooth-tip) of ratchet 66 exceeding the outside diameter of the ratchet 65. Moreover geometrical analysis indicates that an arc drawn from the axis of rotation of the platform 42 (i.e., axle 41) should theoretically pass through the pitch lines of contact of the drive pawl and their respective ratchets and the axis of rotation of the drive pawls (i.e., pivots 83, 84).

The apparatus described above permits of an elegantly simple way of combining, with a single motor drive, both ribbon lift and feed so as to present one of a typing or correction ribbon opposite the print point of a single element typewriter, and providing for automatic feeding of the ribbons, as desired, dependent upon the lift of

the cartridge assembly. Alternate solutions using the same basic elements of this invention for performing the same function will now be described with respect to FIGS. 6 through 13 showing other embodiments of this invention.

Referring to FIG. 6, the ribbon drive means 50 includes a rack 151 which reciprocates interiorally of a housing 153 which depends from the cartridge assembly support or platform 42 so that as the cartridge assembly 15 reciprocates so does the housing 153. As illustrated best in FIGS. 6 and 7, the rack 151 includes teeth 152 which mesh with a sector gear 154 mounted on a shaft 156 which passes through a sidewall 153a of the housing 153. The shaft 156 is connected to a pinion 157 which meshes with a driven gear 158, the driven gear 158 being rotatably mounted on the sidewall 153a of the housing 153. A gear segment 159 (FIG. 6) is connected to the carrier so that as the cartridge assembly reciprocates, the driven gear 158 effects rotation of the pinion 157 and thus the sector gear 154 causing the rack 151 to reciprocate in the direction of the arrow 51a illustrated in FIG. 7.

In order to effect unidirectional rotation of the spiked drivers 23 and 35 only as necessary or desired so as to present fresh portions of the print or correction ribbon to the petals 17a on the print wheel 17, means are again provided for coupling directly to the spiked wheels of the cartridge assembly 15, and operate in synchronism with and dependent upon the distance of reciprocation or arc of travel of the cartridge assembly 15 about the axis or axle 41.

As illustrated, the ribbon drive means 50 includes first and second upstanding pins 160 and 161 respectively which project through the cartridge assembly support means 42 and terminate in spline like ends 160a, 161a respectively for engagement with and into the spiked drivers 23 and

35. The pins 160 and 161 are connected within the housing 153 to first and second ratchet means 165 and 166 respectively, the ratchet means or ratchet 165 being employed therefore to drive the print ribbon 16, while the ratchet 166 is employed to drive the correction ribbon 30. As illustrated in FIGS. 6 and 7, the ratchets 165 and 166 are mounted for rotation in the housing 153, the ratchet 165 having radially extending peripherial teeth 165a thereon while the ratchet 166 has radially extending peripherial teeth 166a thereon. As shown, the ratchet 166 has a tooth pitch P1 greather than the tooth pitch P2 of the ratchet 165. Check pawls 167 and 168 which are spring loaded as by springs 167a, 168a, serve to inhibit rotation of the ratchets in the opposite direction (counterclockwise in FIG. 7) from their driven direction.

In order to effect unidirectional rotation of the ratchet 165 or 166 dependent upon the segment of arc traversed by the cartridge assembly 15 swinging about the axle 41, (i.e., whether print ribbon 16 is to be positioned opposite the petals 17a of the type wheel 17, or the correction ribbon 30 is to be positioned opposite the petals 17a), the rack 151 includes a terminal end 151b having a pawl driver 170 pivotally connected thereto as by a pivot pin 180, the pawl driver 170 including laterally extending, ratchet tooth engaging projections 171 and 172. The throw or travel of the rack 151 due to rotation of the sector gear 154 caused by upward rotation of the cartridge assembly 15 about the axle 41 to present print ribbon intermediate the type print 17a and the platen 13, causes the rack 151 to move to the right (relative to FIGS. 6 and 7) effecting engagement of the ratchet tooth engaging projection 171 with the teeth 165a of the ratched 165 causing the ratchet to rotate in a clockwise direction which likewise effects clockwise rotation of the spiked driver 23 associated with the print ribbon 16. During the first segment of the arc of travel of the cartridge assembly about the axle 41,

(i.e., that segment wherein the print ribbon 16 is opposite the petals 17a) because the pitch P2 of the teeth 165a of ratchet 165 is less than the pitch P1 of the teeth 166a of the ratchet 166, and the distance travelled therefore is less during the first segment of the arc as opposed to the second segment of the arc (wherein the correction ribbon 30 is opposite the petals 17a), only the ratchet 165 is rotated by the projection 171, the tooth 172 moving between positions 1 and 2, i.e., intermediate the adjacent tooth tips of the teeth 166a of ratchet 166. This is best illustrated in FIG. 9 wherein only the ratchet 165 is being driven by reciprocation of the rack 151. Additionally, in order to maintain pawl driver 170 pressure against the ratchets, and as illustrated best in FIGS. 8-10, the pawl driver 170 is biased towards the ratchet 165 and 166 as by a leaf spring 175.

When the cartridge assembly is elevated to the second segment of the arc of rotation about the axis or axle 41, the rack 151 moves farther to the left until the projection 172 of the pawl driver 170 is in the dotted line position labelled 3 in FIG. 9. Then as the cartridge assembly 15 is lowered, the pawl driver 170 reverses direction moving to the right and engaging a tooth 166a of the ratchet 166 effecting rotation of the ratchet 166 and causing feeding of the correction ribbon 30. As illustrated best in FIG. 10, as the pawl driver 170 moves to the right, due to the lowering of the cartridge assembly 15 and support 42, and inasmuch as the ratchet 166 is closer to the pivot pin 180 than the ratchet 165, one of the teeth 166a engaged by the projection 172 effects a camming action on the pawl driver 170 about the pivot 180 lifting pawl projection 171 away from ratchet 165 effecting only an advance of the correction ribbon 30 being driven by the ratchet 166.

In the preferred embodiment of the invention as illustrated in FIGS. 6-10, feeding of either ribbon only occurs during the depression of the cartridge assembly 15.

Moreover, in order to insure print line visibility for the typist, it is preferable that the cartridge assembly 15 be depressed below the print line. To this end the home position for the cartridge assembly when it is depressed into a position illustrated in FIG. 6, i.e., below the print line, is illustrated with regard to the ribbon drive in FIG. 8. As shown, the projection 172 is past any of the teeth 166a of the ratchet 66 while the projection 171 is to the right of or past any of the teeth 165a of the ratchet 165. Thus as the rack 151 is again moved in a leftward direction and the pawl driver 170 is moved in the direction of the arrow 170a, for a new print cycle, the pawl projection 171 and 172 assume the position 1 illustrated in FIG. 9, and normal reciprocation during the first segment of the arc of travel of the cartridge assembly 15 is between positions 1 and 2 illustrated in FIG. 9.

An alternate embodiment of the invention is illustrated in FIG. 11, wherein a cartridge assembly 115 having typing ribbon 216 in a first cartridge 215a, and a correction ribbon 230 housed in a separate cartridge 215b is shown. The cartridges are positioned in superimposed overlapping relation, and joined, if desired, in any convenient manner. In the illustrated instance, the print ribbon 216 passes between a driver metering post 217 and a friction engageable spool 218, the spool 218 including a sheave or pulley 219 thereon which by means of a belt 219a is coupled to a second sheave or pulley 220 mounted on a take up spool 221. In a like manner, the correction ribbon 230 passes between a metering post 222 and a spool 223, the spool 223 including a sheave or pulley 224 which mounts a drive belt or O-ring 224a thereon for coupling to a second sheave 225 which is connected to a correction ribbon 230

take up spool 226. As illustrated in FIG. 11, the drive for each of the metering posts extends upwardly into the cartridge assembly 115. The post 217 is driven by a shaft 217a which terminates in a ribbon ratchet 235, while the drive for the metering post 222 associated with the correction ribbon 230 circumscribes the shaft 217a as by the sleeve 222a and is coupled to a correction ribbon ratchet 236.

Inasmuch as the drives are concentric, a different arrangement of the pawl driver than that previously described with regard to FIGS. 6-10 must be provided. Inasmuch as the cartridge support 42, the drive or stepping motor 47, brackets 40 and axle 41 as well as the segmented gear 43 with teeth 44, pinion 45 and sector gear 59 are identical to that heretofore described relative to FIGS. 1-10, like parts have been given like numbers. As shown, the sector or segment gear 259 matches with a pinion gear 240 which is coupled to a rack drive gear 241 through the housing (removed for clarity) which depends from the support platform 42. The rack drive gear 241 meshes with the teeth 242 of a rack 243, the rack being coupled as by a hinge pin 245 to a pawl driver 244 which is spring biased into engagement with the ratchet 235 or, as will become more clear hereinafter, the ratchet 236. As best illustrated in FIGS. 12 and 13 (representing cross-sections 9, 10 of FIG. 11), the pawl driver 244 includes a radially and inwardly projecting ratchet driver tooth 246 which during the normal printing cycle (i.e., when the typewriter ribbon 216 is opposite the type or petal 17a of the print wheel 17) engages the teeth 235a of the ratchet 235 (FIG. 13). In this embodiment the diameter D1 of the ratchet 235 is less than the diameter D2 of the correction ribbon ratchet 236 while the pitch of the teeth 235a is less than the pitch of the teeth 236a associated with the ratchet 236. Thus the normal swinging of the cartridge through the arc causes print ribbon to be fed while the ratchet driver 246 reciprocates intermediate adjacent teeth 236a of the correction ribbon ratchet 236. When the cartridge assembly

115 is elevated about the axle 41 to a height sufficient to place the correction ribbon 230 intermediate the print 17a of the print wheel 17, the pawl driver 244 will move to the position indicated in FIG. 12, and as the cartridge assembly is lowered due to the depression of the cartridge assembly 115 by the stepping motor 47, the correction ribbon ratchet 236 will be rotated, and due to its greater diameter effects a camming action of the pawl driver 244 away from the teeth 235a of the print ribbon ratchet 235.

Because both lift and feed are accomplished by the single stepping motor 47, virtually any ribbon may be employed merely by changing the size, internally of the cartridge, of the spiked wheels (23, 35, FIG. 2) or metering posts (222, 217 FIG. 11). Thus, for example, a multi-strike ribbon such as the IBM Tech III print ribbon which may be packaged with cover-up tape as the correction ribbon, or correctable film ribbon with the so called lift off tape as the correction ribbon may be packaged together to form the cartridge assembly 15 or 115. For example, in a multi-strike ribbon there may be a five track lift pattern which then can be followed by a 1mm feed increment, while in a correctable film ribbon a two track lift pattern can be employed, then followed by a 3mm feed increment. This is accomplished merely by setting the pitch of the ratchet for the print ribbon such that a full segment of arc of travel of the cartridge assembly is necessary before the driver pawl engages the print ratchet to effect such a rotation.

Moreover, the increments of lift may be set simply by the ratio of the gearing between the pinion 45, and the segment gear 43 as is herein for the embodiment shown in FIG. 3, 6 or 11 and the ratio of segment or sector gear 259 and the pinion 240 and rack driver gear 241 illustrated in FIG. 11. For example, assume that the gear ratio is such that four steps of the stepping motor 47 yields one increment of lift.

From the home position then, 24 steps of the motor 47 will lift the cartridge assembly and thus the print ribbon to, for example, its first typing track. From there, in the instance of a multi-strike ribbon, four steps are required for each increment of lift until the fifth track, then down to the first track using 16 steps (feeding the ribbon) and so forth. For correction, 70 motor steps are required from the home position to lift the cartridge assembly sufficiently to place the lift off tape or correction ribbon opposite the type or petals 17a on the print wheel 17 for lift off correction. After correction, the cartridge assembly is lowered using 70 motor steps to feed the correction ribbon.

The circuitry which operates the stepping motor may be of any convenient type, one such example being illustrated in FIG. 14 which is essentially the circuitry illustrated in U. S. Patent 4,030,591, issued on June 21, 1977 to Martin, et al. As illustrated in FIG. 14, the data which serves to position the ribbon is derived from a data source 350 which may be connected to or part of the keyboard 11 of the typewriter 10. In response to the data, the circuitry illustrated in FIG. 14 generates a series of pulses on line 351 which activates the motor drive circuit 352 such that the stepping motor 47 moves the ribbon to the required track. The signals on line 353 indicate the direction which the stepper motor should move. Each pulse on line 351 causes the stepping motor to move one step. The programmed commands from the data source 350 through the processor 354, ribbon shift register or memory 355 and the count down counter 356 emits 24 pulses to the drive circuit 352 to lift the ribbon to the first track and an additional 16 pulses to go the fifth track.

Set forth below is a typical set of ribbon commands for correctable film ribbon:

Item No.	Ribbon Command	Timing Nos.	No. of Timing Nos.
1.	Go to 1st P.P. after V.T.	N1-N24	24
2.	Go to 2nd P.P. after V.T.	N25-N66	40
3.	Go to Erase after V.T.	N67-N138	70
4.	Go to 2nd P.P. after 1st P.P.	N139-N156	16
5.	Go to 1st P.P. after 2nd P.P.	N157-N174	16
6.	Go to V.T. after 1st P.P.	N175-N198	24
7.	Go to V.T. after end P.P.	N199-N240	40
8.	Go to V.T. after erase	N241-N312	70

V.T. is abbreviation for View Text Position (Home Position)

P.P. is abbreviation for Print Position (i.e., track)

As may be seen from the above ribbon commands, if the typewriter rate exceeds some predetermined rate (for example, a burst of characters) then the cartridge assembly 15 or 115 does not go to the home or View Text (V.T.) position but proceeds directly to the next Print Position (P.P.) or appropriate track. Item No. 4 and 5 are directly in point wherein the command for ribbon lift is "Go to 2nd P.P. after 1st P.P." and "Go to 1st P.P. after 2nd P.P.". In the motor command table set forth below, (which is located in ROM in the processor 354) the status of any of the commands may be found. The numbers indicate "Item No." from the table above, and relate to a correctable film ribbon. It should be noted that the ribbon commands opposite "Erase Character" are multiple. For example, under "Print", "PP1", the item numbers 6-3-8 means ribbon command 6 followed by ribbon command 3 followed by ribbon command 8.

MOTOR COMMAND TABLE

		Last Status			
		Print		Erase or No Character	
		P.P. 1	P.P. 2	P.P. 1	P.P. 2
New Command From Key-board	Print Character	4	5	2	1
	No Character	6	7	No ribbon command	No ribbon command
	Erase Character	6-3-8	7-3-8	3-8	3-8

Thus the apparatus of the present invention provides ribbon feed and lift mechanism which is simple in nature but which provides for a single motor drive to take care of both ribbon lift and ribbon feed.

Although the invention has been described with a certain degree of particularity, it is understood that the present disclosure has been made only by way of example and that numerous changes in the details of construction and the combination and arrangement of parts may be made without departing from the spirit and scope of the invention as hereinafter claimed:

Claims

1. In a typewriter having provisions for receiving a first ribbon cartridge and a second ribbon cartridge in superimposed relation to form a cartridge assembly (15), each of said cartridges including separate ribbon advancing means (23, 35) therein for moving respectively a first ribbon (16) and second ribbon (30) therethrough externally of said cartridges; cartridge assembly support means (42) underlying said cartridge assembly and providing support therefore, and drive means (47, 46, 45, 44, 43, 41, 40) for reciprocating said support means for presenting selectively different portions of said ribbons to a print point along a print line, only the respective ribbon being advanced which is presented to said print point, a ribbon feed mechanism characterized by:

first and second, spaced apart ratchets (65, 66), each having ratchet teeth thereon, said second ratchet having ratchet teeth with a greater pitch than the pitch of the first ratchet, said ratchets being connected respectively to respective ones of said ribbon advancing means;

drive pawl means (81, 82) mounted on said typewriter for engaging respectively said first and second ratchets during reciprocation thereof; and

link means (85) interconnecting said drive pawl means so that upon reciprocation of said support means a distance equal to or greater than the pitch of said teeth of said first ratchet but less than the pitch of the teeth of said second ratchet, only said first ratchet moves due to the engagement of said drive pawl means with said first ratchet; said drive pawl means being positioned so that upon reciprocation of said support means exceeding the pitch of the teeth

of said second ratchet, said drive pawl means effects movement of said second ratchet.

2. In a typewriter having provisions for receiving a typewriter print ribbon cartridge and a correction ribbon cartridge in superimposed relation to form a cartridge assembly (15), each of said cartridges including separate ribbon advancing means (23, 35) therein for moving respectively typewriter print ribbon (16) and typewriter correction ribbon (30) therethrough externally of said cartridges; cartridge assembly support means (42) underlying said cartridge assembly and providing support therefore, and drive means (40, 41, 43, 44, 45, 46, 47) for reciprocating said support means for presenting selectively different portions of said ribbons to a print point along a print line, only the respective ribbon being advanced which is presented to said print point, a ribbon feed mechanism characterized by:

first and second, spaced apart ratchets (65, 66) each having ratchet teeth thereon and connected respectively to respective ones of said ribbon advancing means;

depending bracket means (51) supporting said ratchets from said support means, said second ratchet connected to said correction ribbon advancing means and having ratchet teeth with a greater pitch than the teeth of the first ratchet;

first and second spaced apart drive pawl means (81, 82) pivotally mounted on said typewriter for engaging respectively said first and second ratchets during reciprocation thereof; and

link means (85) interconnecting said drive pawl means so that upon reciprocation of said support means a distance equal to or greater than the pitch of said

teeth of said first ratchet but less than the pitch of the teeth of said second ratchet, only said first ratchet moves due to the engagement of said first pawl with said first ratchet;

said second drive pawl means positioned so that upon reciprocation of said support means exceeding the pitch of the teeth of said second ratchet, said second pawl means effects movement of said second ratchet, and means on said second ratchet for displacing said second drive pawl means about its pivot to displace said first drive pawl means because of said link means, away from said teeth of said first ratchet.

3. In a typewriter having provisions for receiving a typewriter print ribbon cartridge and a correction ribbon cartridge in superimposed relation to form a cartridge assembly (15), each of said cartridges including separate ribbon advancing means (23, 25) therein for moving respectively typewriter print ribbon (16) and typewriter correction ribbon (30) therethrough externally of said cartridges; cartridge assembly support means (42) underlying said cartridge assembly and providing support therefore, and drive means (40, 41, 43-47) for reciprocating said support means for presenting selectively different portions of said ribbons to a print point along a print line, only the respective ribbon being advanced which is presented to said print point, and a carrier (38) mounting said cartridge assembly support means for translation thereof along said print line; the ribbon feed mechanism characterized by:

first and second, spaced apart ratchets (65, 66), each having ratchet teeth thereon and connected respectively to respective ones of said ribbon advancing means;

depending bracket means (51) supporting said ratchets from said support means, said second ratchet connected to said correction ribbon advancing means and having ratchet teeth with a greater pitch than the teeth of the first ratchet and an outside diameter greater than the outside diameter of said first ratchet;

at least one drive pawl means pivotally fixed to said carrier for engaging one of said first and second ratchets during reciprocation thereof by said support means;

said drive pawl engaging said first ratchet when said support means reciprocates a distance equal to or greater than the pitch of said teeth of said first ratchet but less than the pitch of the teeth of said second ratchet, and when reciprocation of said support means exceeds the pitch of the teeth of said second ratchet, said drive pawl means effects movement of said second ratchet, and including means on said drive pawl means about its pivot away from engagement with said first ratchet, thereby inhibiting engagement of said drive pawl means with said first ratchet.

4. In a typewriter in accordance with Claim 2 or 3, the ribbon feed mechanism being further characterized in that, said drive pawl means (81, 82) project upwardly adjacent said first and second ratchets (65, 66), and are provided with means to urge said drive pawl means towards said teeth of said ratchets.

5. In a typewriter in accordance with Claim 4 the ribbon feed mechanism characterized by pivot means (41) connected to said cartridge assembly support means for reciprocation thereof about said pivot means.

6. In a typewriter in accordance with Claim 5 the ribbon feed mechanism being further characterized in that said first ratchet (65) is closer to said pivot means than said second ratchet (66).

7. In a typewriter in accordance with Claim 6 the ribbon feed mechanism being further characterized in that said second drive pawl means (82) is positioned at a greater angle with respect to a horizontal reference than said first drive pawl means (81).

8. In a typewriter in accordance with Claim 6 or 7, the ribbon feed mechanism being further characterized in that said second drive pawl means (82) has a greater length than said first drive pawl means (81).

9. In a typewriter in accordance with Claim 8, the ribbon feed mechanism further characterized in that it includes stop means to limit the rotational motion of said drive pawl means.

10. In a typewriter in accordance with Claim 9, the ribbon feed mechanism further characterized in that said second ratchet has a larger diameter (D2), tooth-tip-to-tooth-tip than said first ratchet (D1).

11. In a typewriter having provisions for receiving a typewriter ribbon (16) and a correction ribbon (30) in a cartridge including separate take-up spools (22, 32); cartridge support means (42) for oscillating said cartridge and presenting different portions of said ribbon to a print point along a print line and selectively presenting correction ribbon to said print point, a ribbon feed mechanism characterized by:

separate typewriter ribbon and correction ribbon drives for feeding respectively typewriter ribbon and correction ribbon, said ribbon drive comprising:

motor means (47) connected to said cartridge support means (42) for oscillating said support means in an arc about an axis (41) substantially parallel to said print line to present during a first segment of the arc, typewriter ribbon opposite the print point, and during a second segment of the arc correction ribbon opposite the print point;

a first reciprocating drive member (151) coupled to said motor means and having a distance of reciprocation proportional to the segment of arc traversed by said support means during its oscillation;

first and second ratchet members (165, 166) respectively coupled to said typewriter ribbon and correction ribbon take-up spools to effect rotation thereof;

pawl means (170) connected to said drive member and including ratchet engaging means (171, 172) for effecting unidirectional rotation of said first ratchet member during the first segment of an arc traversed by said support means without rotation of said second ratchet member, and means for camming (166) said ratchet engaging means away from said first

ratchet member while maintaining engagement with said second ratchet member for effecting unidirectional rotation of said second ratchet member only during the second segment of arc traversed by said support means.

12. In a typewriter in accordance with Claim 11 the ribbon feed mechanism further characterized by a housing connected to said support means (42); said ratchet members (165, 166) and pawl means (170) being supported by said housing.

13. In a typewriter in accordance with Claim 12 the ribbon feed mechanism characterized in that said reciprocating drive member comprises rack means (151) supported for reciprocation within said housing (153), gear means (154, 157, 158, 159) coupled to said rack means to effect reciprocation thereof upon reciprocation of said support means.

14. In a typewriter in accordance with Claim 12 or 13 the ribbon feed mechanism characterized in that said ratchet members (165, 166) are spaced apart in said housing, each of said ratchet members including a plurality of spaced apart, peripherally extending teeth (165a, 166a) thereon; said teeth (166a) of said second ratchet member having a pitch greater than the pitch of the teeth (165a) of said first ratchet member so that said ratchet engaging means (172) reciprocates intermediate adjacent teeth of said second ratchet member during the first segment of arc traversed by said support means.

15. In a typewriter in accordance with Claim 14 the ribbon feed mechanism characterized in that said second ratchet member (236) has a greater outside diameter (D2) than said first ratchet member (235, D1).

16. In a typewriter in accordance with Claim 15 the ribbon feed mechanism characterized in that it includes:

a first shaft (217a) extending upwardly through said support (42) means and connected to said first ratchet member (235), and sleeve (222a) means circumscribing said first shaft and extending upwardly through said support means and connected to said second ratchet member (236).

17. In a typewriter in accordance with Claim 14 the ribbon feed mechanism characterized by pivot means (180) mounting said pawl means (170) to said drive member (151), said second ratchet member (166) being closer to said pivot means than said first ratchet member (165).

18. In a typewriter in accordance with Claim 17 the ribbon feed mechanism characterized in that said ratchet engaging means includes first and second spaced apart projections (171, 172) on said pawl means, said first projection (171) for engaging the teeth of said first ratchet member (165) and said second projection (172) for engaging the teeth of said second ratchet member (166).

19. In a typewriter in accordance with Claim 18 the ribbon feed mechanism characterized in that said means for camming said first ratchet engaging member away from said first ratchet member comprises a tooth of said second ratchet (166) engaging said pawl means during the oscillation of said support means in said second segment of arc thereby effecting disengagement of said first projection from the teeth of said first ratchet member.

20. In a typewriter in accordance with Claim 19 the ribbon feed mechanism including first and second check pawls (167, 168) in engagement respectively with said first and second ratchet members to inhibit reverse rotation of said ratchet members.

21. In a typewriter in accordance with Claim 12 the ribbon feed mechanism characterized in that said typewriter includes a carrier (38), upstanding bracket means (40) mounted on said carrier, an axle (41) on said bracket means mounting said support means (42) and forming an axis of rotation for said support means; a first gear (43, 44) connected to said support means, said motor means (47) including a drive gear (45) thereon for meshing with said first gear to effect rotation of said support means about said axis of rotation.

22. In a typewriter in accordance with Claim 21 the ribbon feed mechanism characterized in that it includes:

a second gear fixed to said carrier (159);

a driven gear (158) mounted on said housing on said support means, and meshed with said second gear so that upon rotation of said support means said driven gear rotates;

and means (157, 154) connecting said driven gear to said reciprocating drive member (151) to effect said reciprocation.

23. In a typewriter including a typing platen (13) and a carrier (38) translatable along said platen, said carrier mounting a typing element (17) and including means for receiving a typewriter ribbon (216) and a correction ribbon (230) mated together in overlapping superimposed relation to form a cartridge assembly (115), including separate take-up spools (22, 32); a ribbon lift and feed mechanism characterized in that

it includes: cartridge support means for oscillating said cartridge assembly (115) and presenting different portions of said ribbons (216, 230) to a print point intermediate said typing element and said platen and along a print line and selectively presenting correction ribbon (230) to said print point; motor means (47) connected to said cartridge support means for oscillating said support means in an arc about an axis (41) substantially parallel to said print line to present during a first segment of the arc, typewriter ribbon (216) opposite the print point, and during a second segment of the arc correction ribbon (230) opposite the print point; typewriter ribbon and correction ribbon drives (217, 222) for feeding respectively typewriter ribbon and correction ribbon during oscillation of said support means, said ribbon drives comprising; a reciprocating drive member (243) coupled to said motor means and having a distance of reciprocation proportional to the segment of arc traversed by said support means (42) during its oscillation; first and second ratchet members (235, 236) respectively coupled to said typewriter ribbon and correction ribbon take-up spools to effect rotation thereof; each of said ratchet members including a plurality of circumferentially projecting teeth thereon, the teeth of said second ratchet member having a pitch greater than the pitch of the teeth of said first ratchet member; pawl means (244) connected to said drive member and including ratchet engaging means (246) for effecting unidirectional rotation of said first ratchet member during the first segment of an arc traversed by said support means and due to the distance of reciprocation of said pawl means being less than the pitch of said second ratchet member, without rotation of said second ratchet member; said ratchet engaging means (246) effecting unidirectional rotation of said second ratchet member (236) only during the second

segment of arch traversed by said support means, one of said teeth of said second ratchet member (236) serving as a cam for camming the pawl means out of engagement with said first ratchet member.

24. In a typewriter in accordance with Claim 23 the ribbon feed and lift mechanism being further characterized by a housing connected to said support means, said ratchet members and pawl means being supported by said housing.

25. In a typewriter in accordance with Claim 24 the ribbon feed and lift mechanism being characterized in that said reciprocating drive member comprises rack means supported for reciprocation within said housing, gear means coupled to said rack means to effect reciprocation thereof upon reciprocation of said support means.

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FIG. 1

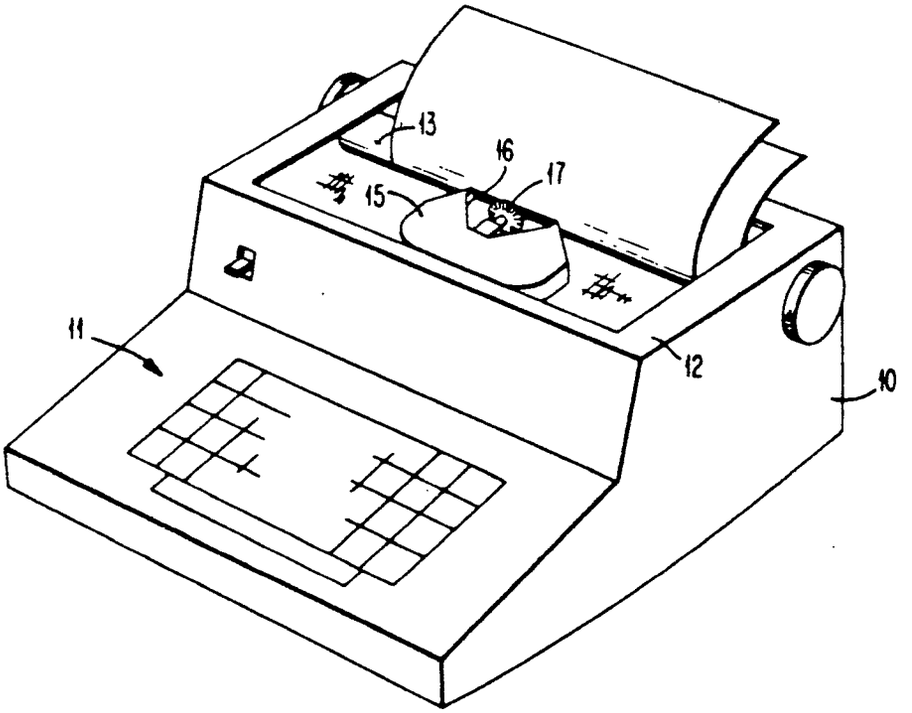
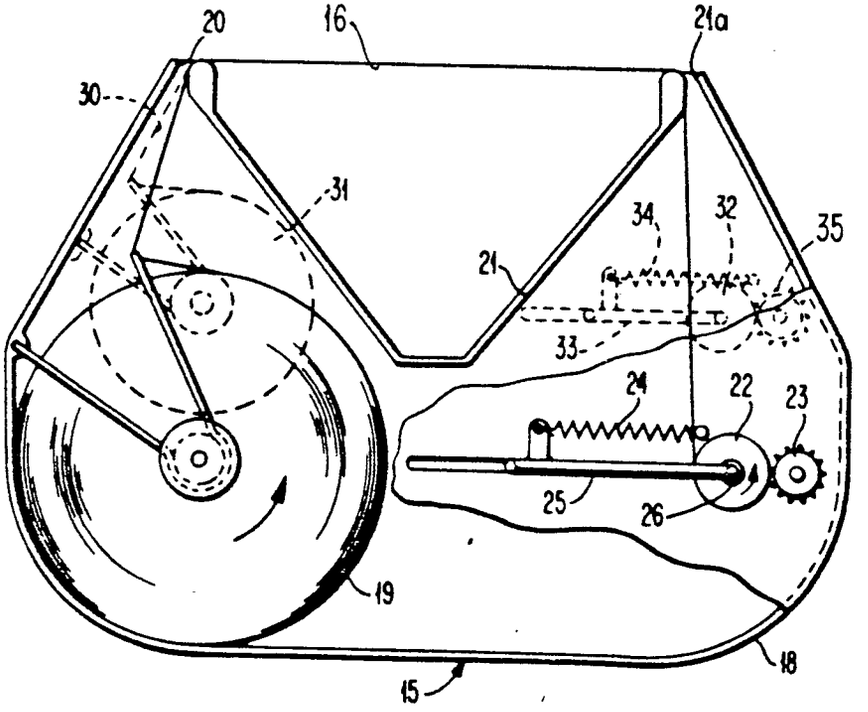
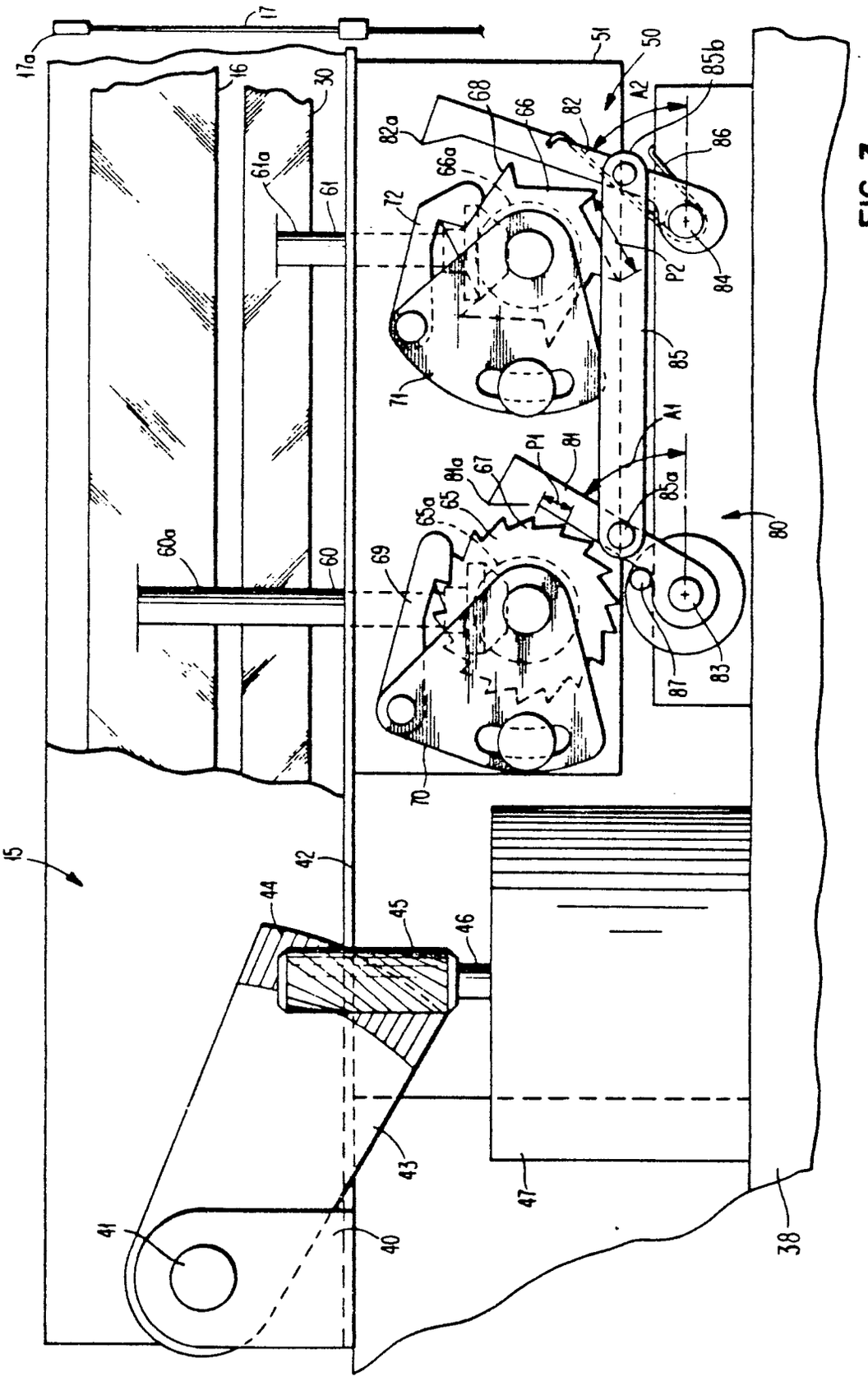


FIG. 2

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82a
66a
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P2
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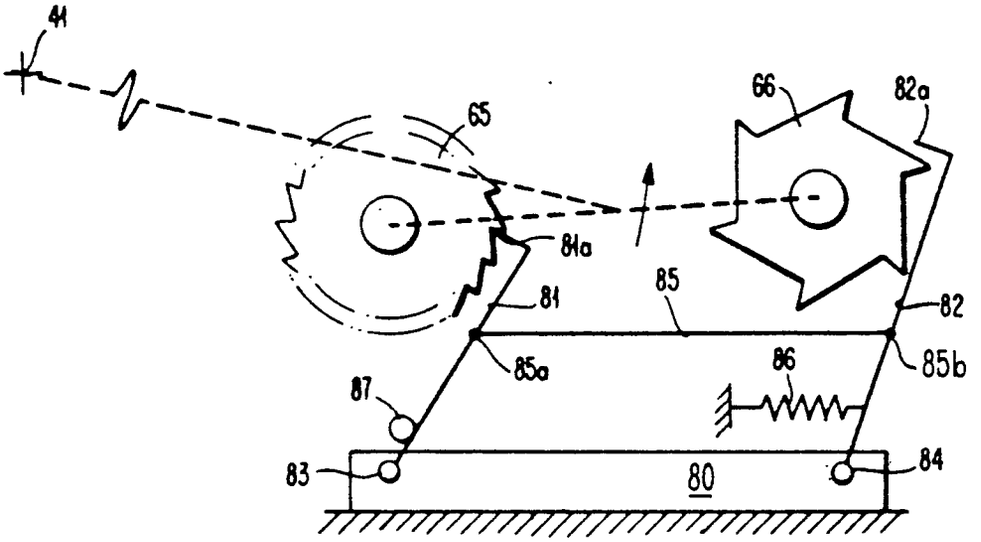
70

FIG. 3

FIG. 4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82
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85b
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84

FIG. 5

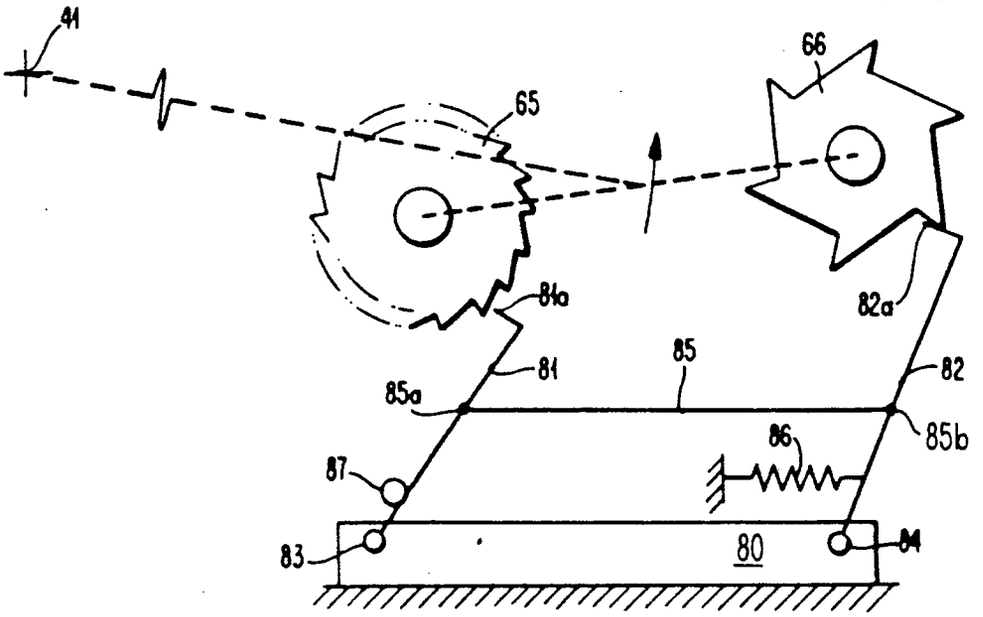
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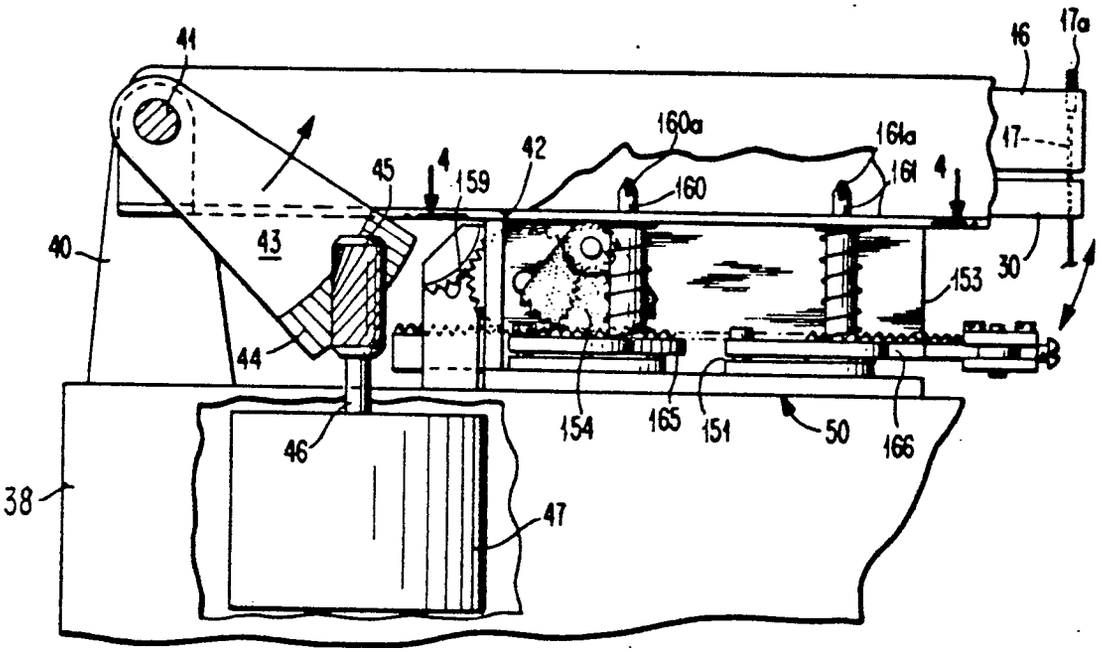
FIG. 6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164a
17
45
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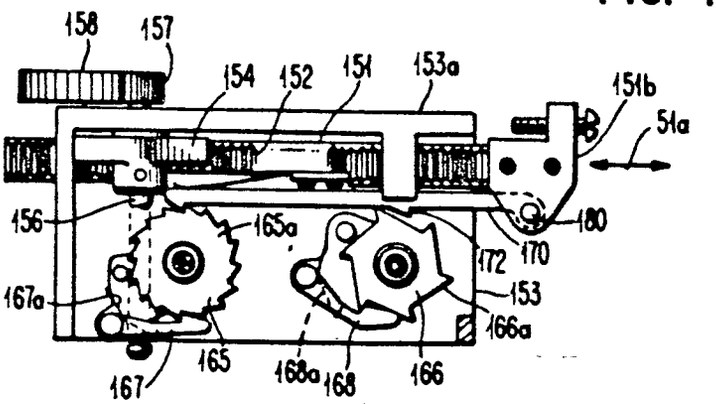
165
151
50
166
46
38
47

FIG. 7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154
152
151
153a
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167a
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168a
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166
167

FIG. 8

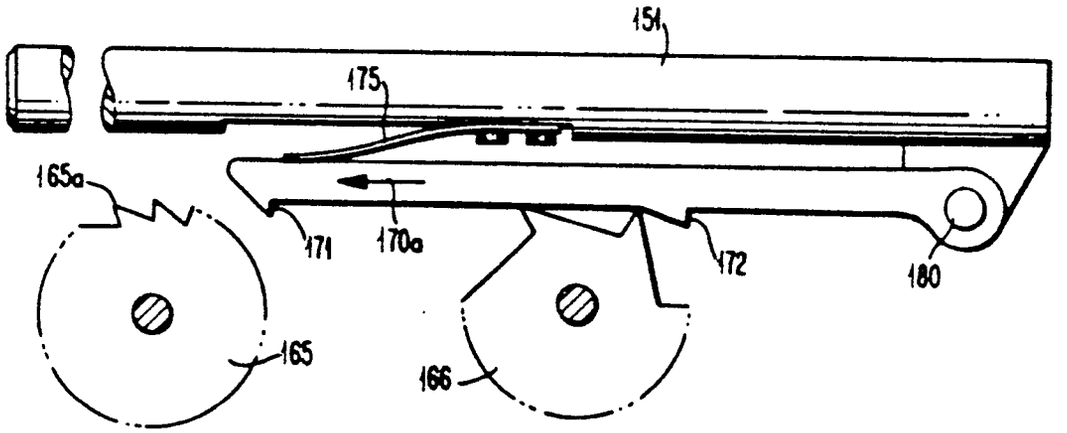


FIG. 9

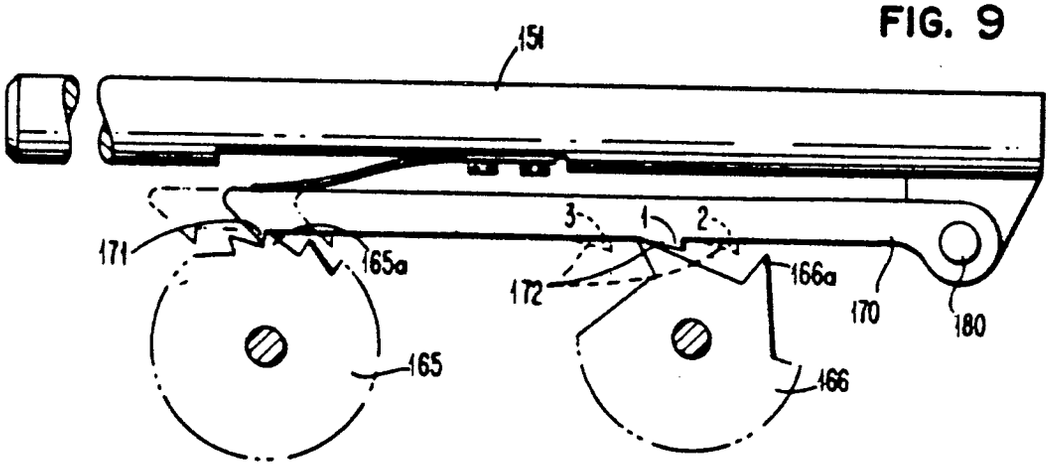


FIG. 10

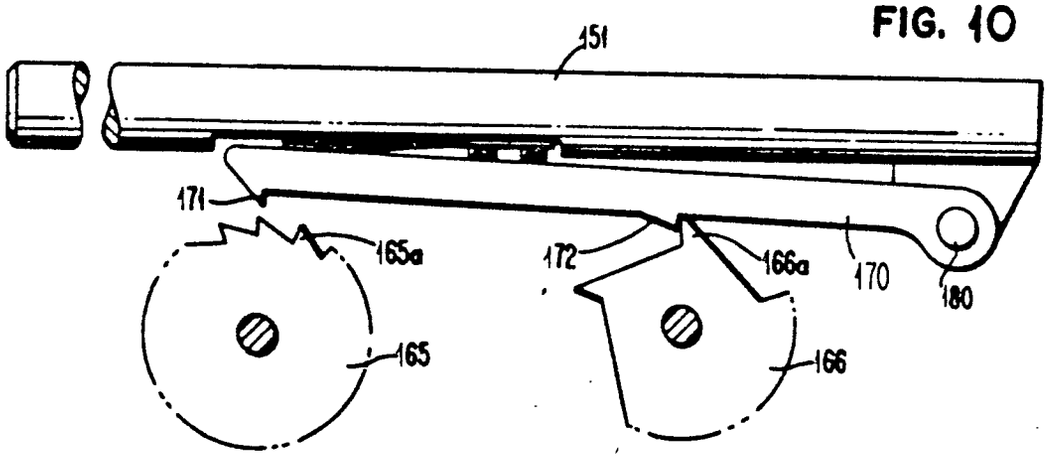


FIG. 11

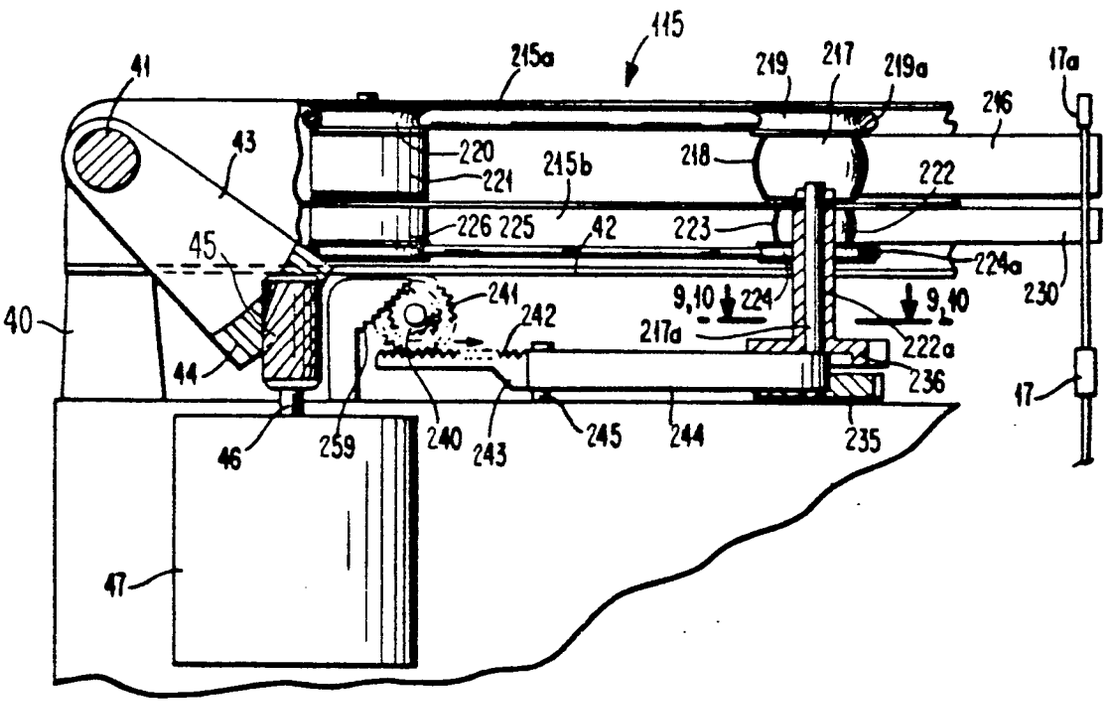


FIG. 12

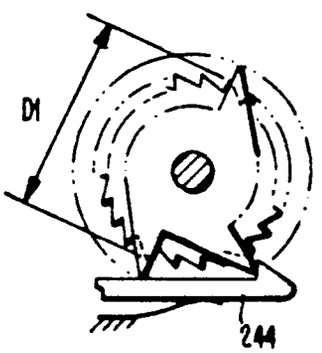
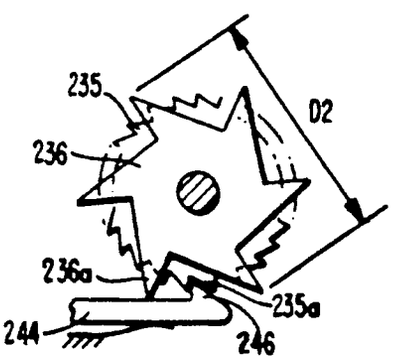


FIG. 13



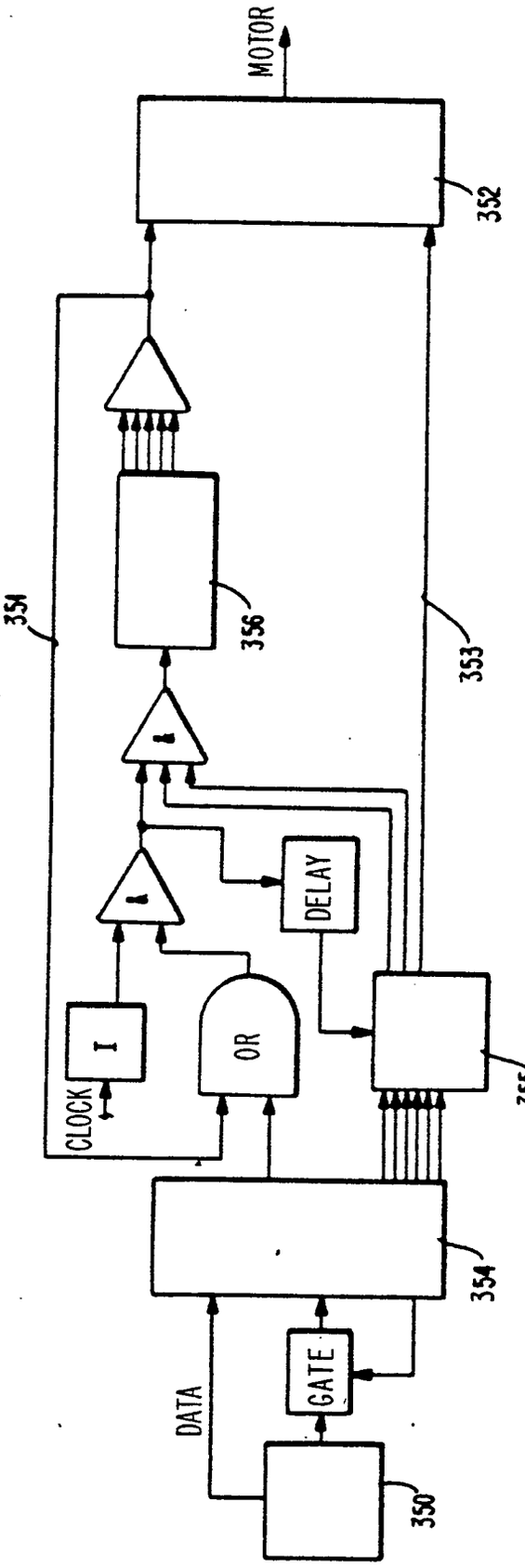


FIG. 14