May 30, 1967 C. H. CLARK ETAL 3,322,316

LINE FEED MECHANISM

Original Filed Oct. 25, 1962

3 Sheets-Sheet 1

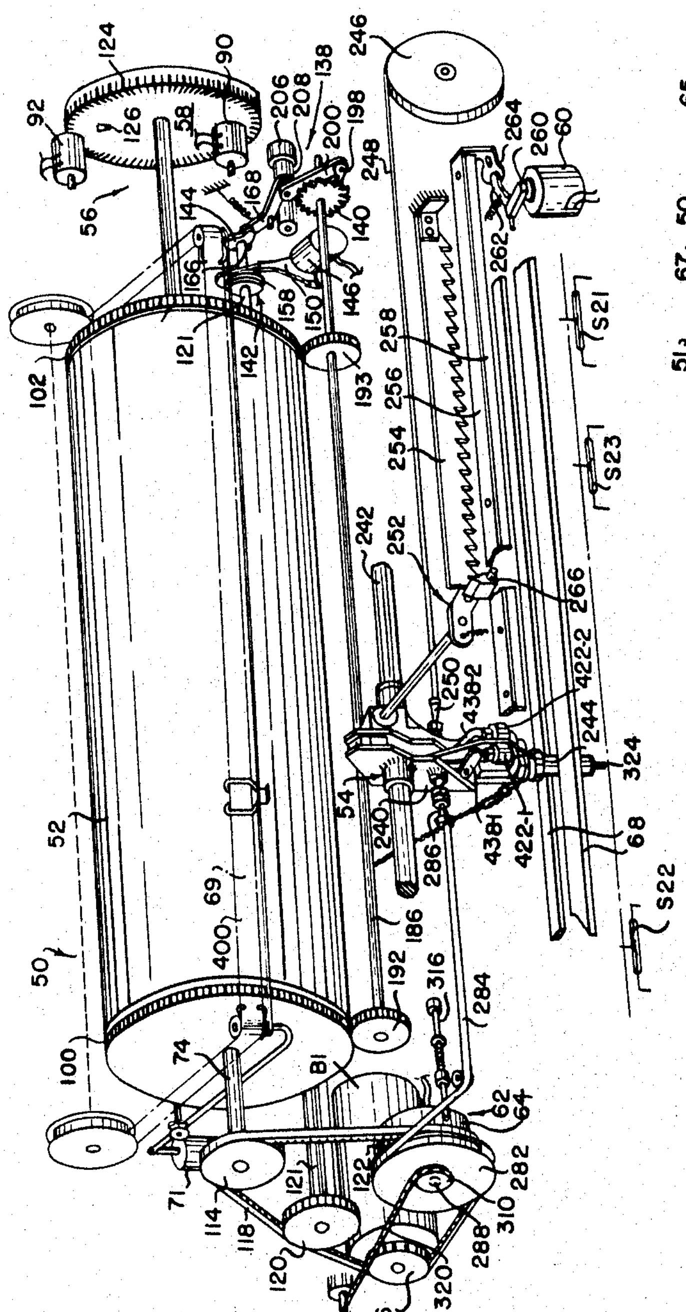

FIG. 1

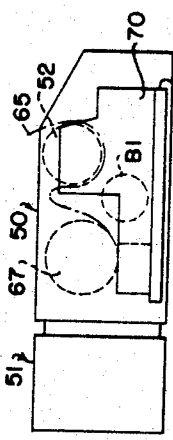

FIG. 2

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3 Sheets-Sheet 2

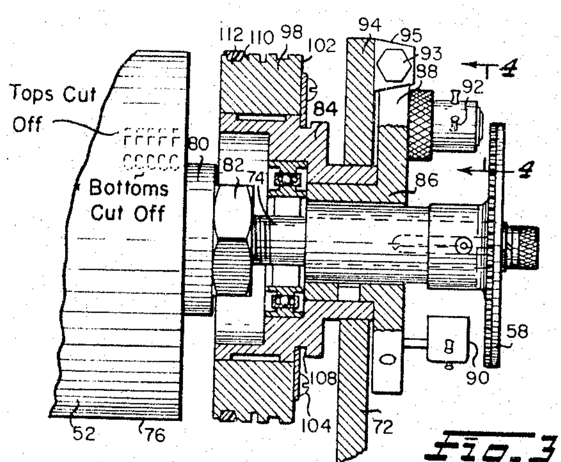

Fig. 3

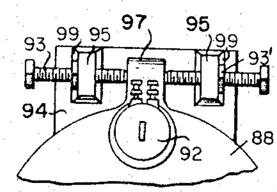

Fig. 4

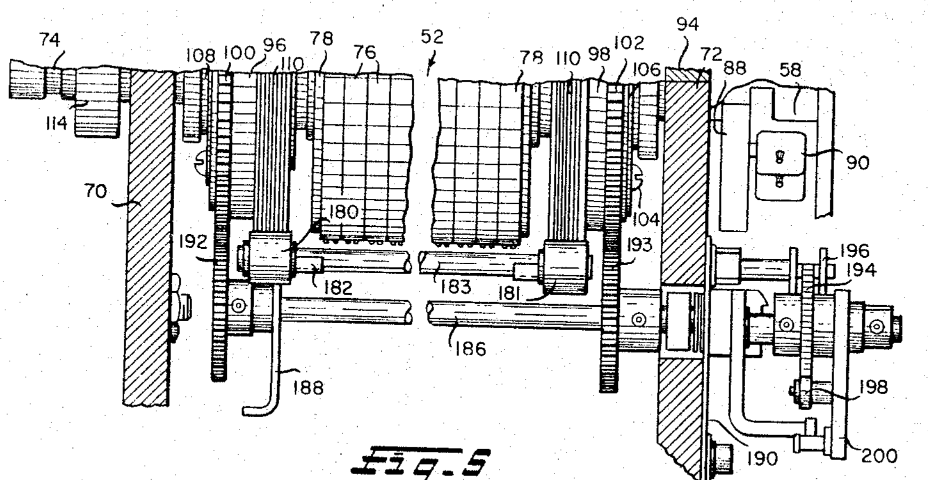

Fig. 5

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3 Sheets-Sheet 3

Fig. 6

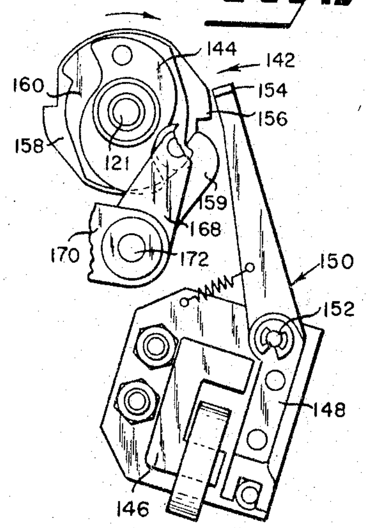
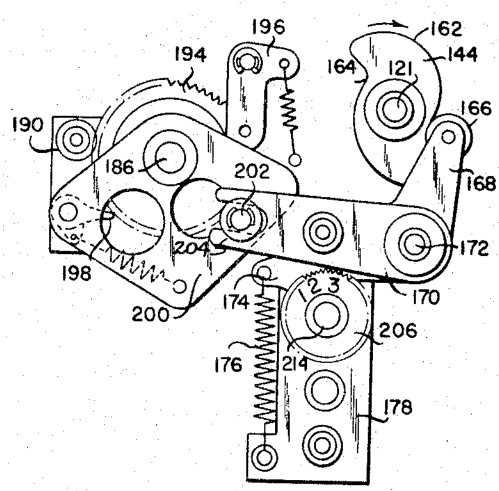


Fig. 7



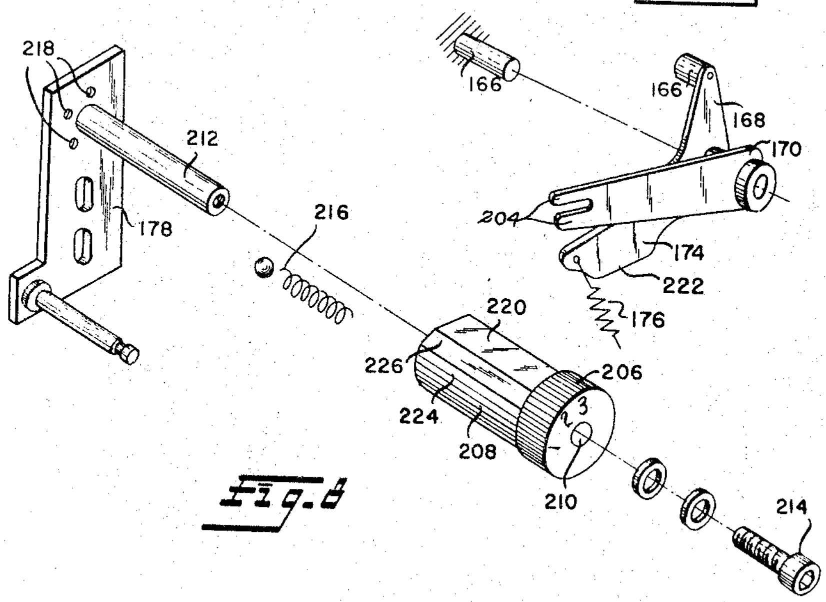


Fig. 8

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United States Patent Office 3,322,316
Patented May 30, 1967

3,322,316
LINE FEED MECHANISM

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Original application Oct. 25, 1962, Ser. No. 233,109, now Patent No. 3,291,909, dated Dec. 13, 1966. Divided and this application May 2, 1966, Ser. No. 546,917
7 Claims. (Cl. 226—141)

This application is a division of copending application Ser. No. 233,109, filed Oct. 25, 1962, now Patent No. 3,291,909.

This invention relates to a line feed mechanism for page printers which was developed for use in a receiving page printer utilizing a continuously rotating print drum and a traveling print hammer carriage, primarily intended for either fixed station or vehicular installation as sending monitors or printing receivers in telegraphic communication systems. Nevertheless the line feed mechanism is versatile and readily adapted for use with other data processing page recorders such as electric typewriters and conventional telegraph printers.

The improvements of this present invention involve the mechanical components to accomplish selectively variable record paper feed which will be referred to as line feed hereinafter. As compared with the line feed mechanism described in co-pending application Ser. No. 184,820, filed April 3, 1962, now Patent No. 3,280,256, the line feed mechanism has been substantially improved and made more versatile by utilizing a motor driven power feed rather than a solenoid operated feed and by using a novel controllable line feed to enable variation in the number of lines the record is fed during each feed operation, the power required being proportional to the line feed desired.

Accordingly, a primary object of this invention resides in the provision of an improved line feed mechanism for use in data processing equipment such as page printers or telegraph typewriters and the like.

Still another object resides in the provision of an improved page printer with novel record medium line feed mechanism powered from a power shaft driven, rotatable start-stop cam assembly and a cam follower linkage operating a pawl and ratchet transmission to the record engaging feed components, having means to vary the magnitude of the actual stroke of the cam follower as imparted by the power driven cam assembly. In conjunction with the foregoing object, it is a further object to accomplish the start-stop line feed cycle by a solenoid which will enable associated equipment control circuitry to automatically accomplish a line feed cycle energization of the line feed solenoid for every carriage return operation of a page printer.

A still further object resides in a provision of a novel selectively variable record medium line feed mechanism for use in typing or printing mechanism. In connection with the preceding object, a further object resides in providing an improved line feed mechanism in which the power stroke is selectively variable.

Further novel features and other objects of this invention will become apparent from the following detailed description, discussion and the appended claims taken in conjunction with the accompanying drawings showing the subcomponent structures and units constituting the present invention, in which:

FIGURE 1 is a front perspective skeleton view illustrating the major mechanical components of a drum printer which incorporates the line feed mechanism of the present invention. Although this view omits many details utilized in such a drum printer they are not deemed necessary to an understanding of the present invention;

FIGURE 2 is a reduced scale, side view of the complete printer with a module containing the printer electronics at the rear;

FIGURE 3 is a partially sectioned detail view in elevation, illustrating the right-hand end of the print drum, its rotational mounting, one paper feed wheel and the clock assembly with its adjustable reading head timing support disc;

FIGURE 4 is a detail end view of the reading head timing support disc taken on line 4—4 of FIGURE 3;

FIGURE 5 is a partially sectioned elevation view of the lower half of the print drum illustrating the relationship between the print drum, the frame end supporting plates and the paper feed components;

FIGURE 6 is a detail end view looking at the right-hand side of the printer and illustrating the line feed solenoid and the relationship between its armature lever and the positive line feed clutch;

FIGURE 7 is a right-hand end view illustrating the mechanical linkage between the line feed cam (shown in FIGURE 6) and the line feed actuating pawl mechanism; and

FIGURE 8 is an exploded perspective view illustrating the means by which the total line feed power stroke may be varied to accomplish different amounts of paper feed.

GENERAL

The major mechanical components of a drum form of page printer, including the line feed arrangement pertinent to this invention, are shown in the skeleton arrangement of FIGURE 1 as an example of utility of the line feed mechanism. It will be generally described before proceeding with a detailed description of the line feed mechanism. The frame structure of the printer, the ribbon feed and reverse mechanism and various controls are not shown in FIGURE 1, however a representative somewhat similar drum printer assembly can be found in co-pending application Ser. No. 184,820 to which reference may be had, if necessary, for a complete understanding of the printer construction.

The printer is designed primarily for use in a send-receive tele-printer set, being used for page copy monitoring and/or page copy receiving.

A single hammer printer embodiment is capable of operating at nominal average speeds up to and including 200 w.p.m. and if dual print hammers are utilized, with double step character spacing, average operational maximum speed is appreciably increased, up to at least 400 w.p.m. Further multiplication of the number of hammers results in attaining of higher operational speeds which will necessitate related increase in rates of line feed.

In general, the printer mechanics **50** employs a motor driven rotating type drum **52** which, for standard communications printers, will have 72 rings of type, each type having the 52 standard communications symbols. The drum and its construction is fully described and claimed in the aforenoted pending application Ser. 184,-820 or divisional thereof and, per se, are not a part of the present invention.

Characters on each ring of type are similarly placed in binary order according to the Baudot code for the character, each character being assigned a position in a **64** count binary progression so that the printer electronics can compare an incoming charater ode against a ode combination representative of the series of pulses subsequent to an index position which indicates the physical position of the drum characters relative to that indexing position. When comparison matches, coincidence, the electronic logic can determine exactly when to actuate the print hammer for printing the character when the drum rotates that character in front of the print hammer.

The complete dum **52** includes on is cylindrical periphery a plurality of different horizontal lines of identical information symbols, for a conventional telegraph printer, seventy-two (72) identical symbols, e.g., seventy-two A's, constituting one line of identical character type faces extending along the cylindrical drum periphery parallel to the drum axis. The drum **52** and an attached drum position clock wheel **58** are continuously rotated by a printer motor **B1** when the motor is running. Related printer electronics are described in parent application 233,109.

As depicted in FIGURE 1, a print hammer carriage assembly **54** is mounted for stepped spacing movement in a horizontal path from left to right and return movement from right to left in front of the type drum **52**. The illustrated hammer carriage assembly **54** is universal in nature and can accommodate one or two print hammers with associated operating components.

The printing mechanism includes an induction pulse clock assembly **56** which supplies one index pulse and a series of character position pulses to the printer electronics, representative of drum rotational position. Since each character position pulse represents a different character reaching a definite drum rotational position, the pulses constitute infomation which allows the printer electronics to energize the print hammer solenoid as the desired character moves in front of the hammer, or to actuate different machine functions if the received code signal combination are function signals.

The print hammer carriage **54** is stepped across in front of the drum **52** and parallel to the drum axis by spacing mechanism actuated by a spacing solenoid **60** mounted at the right-hand side of the printer. Carriage **54** is power driven to a start-of-line position at the left-hand margin by a carriage return mechanism **62**, seen at the left hand side of FIGURE 1. Carriage return mechanism is activated by the carriage return magnetic clutch **64**, power for carirage return being derived, through clutch **64**, from the printer motor **B1**.

Shown diagrammatically in FIGURE 2, a sheet paper strip record medium **65** is supplied from a paper roll **67** mounted behind the drum **52**, the paper strip feeding over suitable guide devices (not shown), under and up past the front of the drum **52**, passing between the drum **52** and the print hammer carriage **54** and under two side edge top guide fingers (not shown). The paper strip **65** then passes on out of the top of the printer unit **50**.

Paper feed is enabled by cooperation of two large friction banded feed wheels at the ends of the drum and two presure rolls (see FIGURE 5) under the drum which press the paper against the two large feed wheels which are selectively, incrementally driven.

Seen in skeleton form in FIGURE 1, an ink ribbon **69** passes across the drum face parallel to the drum between the print hammer and the paper to transfer the typed impresion from the drum to the page during a print operation. The ink ribbon assembly feed and reverse mechanism is conventional and details are not shown. However, the ink ribbon **69** in this printer passes in a straight stretch across the front of the drum **52** parallel to the character spacing path of the print hammer, and the entire straight stretch of the ink ribbon if desired can be lowered and lifted by action of a ribbon lift solenoid **71** to a position in front of the hammer just prior to each printing action. This operation enables viewing of the line being printed without its being obscured by a permanently placed stretch of ink ribbon. Mechanism to accomplish this ribbon lift is not a part of this invention.

The printer components are mounted on a support structure which includes a thick base plate **66** (FIGURE 2) incorporating a slotted center track **68** (FIGURE1) which passes lateraly from one side of the printer to the other and under the path of travel of the print hammer carriage **54**. Two vertical side plates **70** and **72** (see FIGURES 3 and 5) are rigidly secured to the base plate **66** and provide mounting structure for most of the printer components. Support structure details are not shown in

FIGURE 1, but portions of the base plate and side plates can be seen in some of the other figures.

The printer electronics is preferably transistorized and mounted either in a module **51** (FIGURE 2) on the back of the printer mechanics or incorporated in large printed circuit boards secured on the underside of the printer frame stucture.

The electric drive motor **B1** supplies rotational driving power to the printer mechanism **50** by means of a drive belt **118** which connects the motor to the drum shaft, a function power shaft and a carriage return clutch. Drive belt **118** passes around a drive pulley **116** attached to the motor shaft and to three driven pulleys **118**, **120** and **122**, pulley **120** being later referred to in more detail. To prevent slippage, the drive belt is notched and engages corresponding gear teeth in each pulley.

Referring particularly to FIGURES 1, 3 and 5 the print drum **52** is preassembled in an lightweight inexpensive manner from a plurality of discs, preferably double type row wheels **76**, manufactured to very close tolerances. A desired number of type wheels **76** are placed on the drum shaft **74**, indexed to align all characters and clamped together by two end clamping plates **78**, adjacent spacers **80** and nuts **82**, the latter being threaded and torqued very tightly on intermediate threaded sections of the drum shaft **74**. Both sets of clamping plates **78**, spacers **80** and nuts **82** are suitably locked together, after the clamping pressure is achieved. This construction is described and claimed in co-pending applications Ser. No. 184,820, filed April 3, 1962 and Ser. No. 481,796, filed Aug. 22, 1965.

The clock wheel **58** is non-rotatably secured to the right-hand end of drum shaft **74** and has peripheral character reference notches **124** properly located relative to the angular positions of the print characters on the drum **52** and one index notch **126** located radially inside of the path of notches **124**. The positioning of the monitor heads **90** and **92** will provide one indexing pulse and 64 reference pulses once during each rotation of the print drum **52**, although the index pulse is utilized only whenever the print drum starts to rotate. As the clock wheel **58** rotates with the print drum **52**, the moving notches vary the reluctance of bar type magnets located in the clock monitor head coils **90** and **92** inducing appropriate current pulses into associated transistor amplifiers which are not described herein.

A left-hand bearing retainer assembly is placed over the left-hand end of the drum shaft **74**. A somewhat similar right-hand bearing retainer assembly **84** (FIGURE 3) and shaft bearing are placed over the right-hand end portion of drum shaft **74**. The right-hand bearing assembly **84**, shown in FIGURE 3, is telescoped over a sleeve boss **86** which is integral with and projects from one side of a clock head mounting and timing disc **88**. The disc **88** mounts the two printer clock monitor heads **90** and **92** in desired positions, as diagrammatically illustrated in FIGURE 1. By means of the two adjusting screws **93** and **93'**, illustrated in FIGURE 4, the angular position of the timing disc **88** relative to the print line can be adjusted to make incremental changes of the index and reference pulse count positions.

The drum end bearing retainers are clamped in sockets on top of respective printer frame end plates **70** and **72** by clamping caps such as the right-hand clamp cap **94** seen in FIGURES 3 and 4. The right-hand end plate cap **94** has two spaced apart lugs **95** on its outer face, the lugs having threaded bores that receive the two opposed timing disc adjusting screws **93** and **93'**, the ends of which engage an integral angular positioning finger **97** on the timing disc **88**. Adjusting screws **93** and **93'** are locked in adjusted position by lock nuts **99**.

The purpose of the timing disc adjustment is to insure proper time correlation between the received character coincidence count pulse from the character clock head to the printer electronics and the print strokes of the hammer or hammers, correlation depending upon the angular fixed position of the clock heads, so that the printed characters are not cut off at the top or bottom as depicted in FIGURE 3.

Referring to FIGURES 3 and 5, before the hubs of the drum end bearing retainers are positioned and clamped in their sockets by the clamp caps, left and right-hand record medium feed wheels **96** and **98**, with associated ring gears **100** and **102** are placed on external bushing sleeves made integral with the associated bearing retainers. The feed wheel gears may be integral or separable from the feed wheels. In the latter case they are clamped to the respective feed wheels **96** and **98** by screws **104**. In either case split annular ring clamping plates **106** could be fastened to the sides of feed wheels **96** and **98** and fit into and ride in grooves **108** in the non-rotatable end bearing retainer body, thereby axially maintaining the feed wheels **96** and **98** in desired positions adjacent each end of and rotatable relative to the print drum.

A rubber ring **110** is stretched over the periphery of each feed wheel **96** and **98** and fitted into half circle grooves **112** in the periphery of its feed wheel. The rubber ring can be preformed or it is cut or ground down so its outer periphery is almost even with the feed wheel periphery, thereby serving as a friction tire or band to engage and line feed the page record medium, by means to be hereinafter described. Note, the feed wheels are rotatably mounted on the bearing retainers which in turn are clamped in adjacent printer frame end plates **70** and **72** and the shaft of the print drum **52** is rotatably mounted in and extends through the bearing retainers. Drum and feed wheels rotate completely independent of each other.

The left-hand end of the drum shaft **74** projects beyond the left-hand frame end plate **70** and a gear toothed pulley **114** is non-rotatably secured thereto by set screws. Turning back to FIGURE 1, the printer motor B1, which will be mounted on the printer support structure inside of frame plate **70**, is disposed with its shaft parallel to the drum shaft **74** and carrying a toothed drive pulley **116**. The notched drive belt **118** meshes with the teeth in motor pulley **116**, and with the other three pulleys, the drum pulley **114**, a function shaft pulley **120** and a carriage return clutch input pulley **122**. As has been described hereinbefore, whenever the printer motor B1 is energized, the drum **52** will be continually rotating, and printing occurs "on-the-fly."

Line feed.—Referring generally to FIGURE 1 and specifically to FIGURES 5–8, the record paper **65** is fed through the printer one line (or more) at a time by the action of the line feed mechanism **138**, different spacings of line feed being easily and conveniently changed, as will be hereinafter described.

Looking at FIGURE 1, the motor driven belt **118**, through the power shaft pulley **120**, rotates the power shaft **121** which extends parallel and to the rear of drum **52** to the right-hand side of the printer mechanisms. Power shaft **121** is continually rotating and provides power for both the line feed and the ribbon feed and reverse mechanisms. The ribbon feed mechanisms (not shown) is operated continuously by the power shaft, and the line feed mechanism **138** is selectively cyclically operated through the action of a positive action start-stop clutch mechanism **142** which couples the right-hand end of power shaft **121** to a line feed cam **144**.

Detailed construction of a suitable start-stop power shaft clutch is shown and described in Kleinschmidt et al. U.S. Patent No. 3,009,988 (see FIGURES 29–32 of that patent). Although the clutch stop plate of that disclosure uses only a single stop lug to accomplish 360° start-stop cycling, two lugs at diametrical positions will enable 180° start-stop cycling.

FIGURE 6 illustrates the positive clutch **142** just after its plate is released so that the clutch is engaged to cam **144** and the cam has started to rotate. To accomplish clutching, the line feed solenoid **146** is energized, attracting the armature end **148** of the clutch stop lever **150**, which pivots stop lever **150** clockwise on post **152** against the bias of spring **154** and removes the stop lever blocking end **154** from blocking position in front of clutch plate lug **156**. This unblocking of the clutch plate **158** permits the clutch to make a positive connection between the power shaft **121** and feed cam **144**, driving the line feed operating cam through 180 degrees.

The line feed solenoid **146** is only momentarily energized (10 ms.) and long before the feed operating cam **144** can complete a half revolution, it has released the stop lever armature **148** which returns to its spring biased blocking position where lever blocking end **154** is engaged by the next stop lug **156** of clutch plate **158**. Blocking of clutch plate **158** disengages the clutch **142** at the end of the half revolution. A clutch detent arm **159** and detent cam **160** fixed to the feed cam **144** ensures that the clutch **142** remains disengaged until the stop plate **158** is again released.

Line feed operating cam **144** is a dual cam, as shown in FIGURES 6 and 7, having two opposed identical radial rises **162** followed by abrupt drop-offs into identical dwells **164**. A roller **166** on the end of a spring biased cam follower arm **168**, disposed in the path of the cam lobes will be engaged by the operating cam and will make the follower arm cycle once for each 180° of operating cam rotation.

Shown in FIGURE 7, cam follower arm **168** is secured to a link **170** to form a dog-leg bellcrank pivoted on post **172**. The cam follower bellcrank has a spring anchor finger **174** connected to one end of biasing spring **176**, the other end of which is anchored on a post fixed to a support bracket **178**. Spring **176** urges the cam follower counterclockwise so its roller **166** is urged toward the periphery of the feed operating cam **144**.

Turning again to FIGURE 5, it will be seen that the aforedescribed feed wheels **96** and **98** at the ends of the print drum, advance the paper by rotation while pressing the paper against two pressure rollers **180** and **181**. The two pressure rollers **180** and **181** are mounted on flat springs **182** which are fixed to a pressure roller release shaft **183**. Attached to the pressure roller release shaft is a pressure release lever (not shown). When the pressure release lever is moved to the rear of the printer and latched, the pressure roller release shaft is rocked to move the pressure rollers **180** and **181** into spring biased engagement with the left and right edge portion of the paper record strip, pressing the paper record tight against the high friction, paper feed wheel bands **110**, thereby enabling controlled line feeding of the paper, by powered, incremental, simultaneous rotation of the two feed wheels **96** and **98**.

Parallel to the drum axis and passing under the drum **52**, and toward the front of the printer is a line feed shaft **186** rotatably mounted on brackets **188** and **190** secured to the printer frame. Shaft **186** extends through the right-hand end plate **72** and through and projects beyond its right-hand support bracket **190**. Right and left line feed driving gears **192** and **193**, non-rotatably attached to the line feed shaft **186**, mesh with and impart incremental drive to the gears **100** and **102** which are fastened on the paper feed wheels **96** and **98**.

The paper record is firmly held in a given position or it can be fed one or more lines at a time by stepping a line feed ratchet wheel **194** non-rotatably secured on the projecting right-hand end of the line feed shaft (FIGURES 5 and 7).

To keep the paper from inadvertently line feeding during printing, the ratchet wheel **194** is detained in its rotational position by a conventional line feed detent **196** shown in FIGURE 7. During line feed operation, the ratchet wheel **194** is turned one or two (or more) spaces by a spring biased line feed pawl **198** pivotally mounted on a line feed pawl bail **200**. Bail **200** is axially maintained and rotatably pivotally mounted on the projected end of line feed shaft **186**, by a collar.

A post **202**, fixed in one arm of pawl bail **200** is engaged by a forked end **204** of the cam follower link **170** thereby enabling rocking movement of the feed cam follower to concurrenty rock the pawl bail **200** about the axis of line feed shaft **186**. Counterclockwise rotation of the feed pawl bail **200** causes the line feed pawl **198**, which is always biased into engagement with the teeth of the feed ratchet wheel **194**, to positively rotate the feed shaft **186** against the detent action of the line feed detent **196**. After the paper record is fed, by rotation of feed shaft **186**, the line feed detent **196** engages a tooth of the ratchet wheel **194** to prevent further inadvertent movement of the line feed gears. As the pawl bail **200** completes the return stroke of its cycle, pawl **198** ratchets back over the teeth of ratchet wheel **194**.

The angular increment of rotation of the pawl bail **200** and thence, through pawl **198**, to rotate the line feed shaft **186**, depends upon the initial position of the cam follower roller **166** relative to the low dwell **164** of line feed operating cam **144**. This initial position can be changed by changing the setting of a selector knob **206**, FIGURES 7 and 8, to permit one, two or three lines to be fed per line feed solenoid operation. Knob **206** is formed on the end of a cylinder **208** with a through bore **210** enabling the cylinder to be rotatably disposed on a fixed post **212** under the lateral spring biased forked arm **174** of the cam follower bellcrank. Cylinder **208** is axially retained on post **212** by screw **214**, but can be manually rotated on the post to a plurality of angular positions as determined by a spring loaded ball detent **216** located in an eccentric blind bore in the end of cylinder **208**. The ball detent **216** is biased against the mounting pate **178** and engages an associated one of a number of small holes **218** located on a circular arc in plate **178**, depending upon the selection.

In FIGURE 7, the knob **206** is positioned with the number 3 uppermost, indicating that each line feed operation will result in the feeding of the paper record, a distance of three lines. In the number 3 position, a large cam flat **220** (see FIGURE 8) on selector cylinder **208** is disposed directly under a cam follower portion **222** of the bellcrank spring arm **174** which in the inoperative condition, is biased against the surface of cylinder **208** which is positioned uppermost, i.e., the cam flat **220**. This permits the line feed bellcrank to rock counterclockwise a distance that drops the cam follower roller **166** all the way to the bottom of a line feed operating cam lower dwell **164**. Subsequent 180° rotation of line feed cam **144** resulting from energizing of the line feed solenoid **146** will lift the roller **166** to the top of a line feed cam rise **162** causing a clockwise power movement of the bellcrank follower sufficient to rock the pawl bail **200** counterclockwise a distance through which the pawl **198** drives the feed shaft **186** an angular increment to feed the paper three lines.

If the selector knob is set with the number 1 uppermost, the spring biased forked arm **174** of the cam follower bellcrank will hit a high surface **224** on cylinder **208** and cannot move counterclockwise under spring bias as far as it did in selector position 3. Therefore the cam follower roller **166** will not drop all of the way into a lower dwell **164** of the operating cam **144**. Now, subsequent 180° rotation of operating cam **144** will only rock the cam follower under positive power a small increment (about ⅓ of that previously described for setting number 3) resulting in movement of the feed pawl **198** an amount sufficient only to line feed the paper one space.

If the selector knob **206** is placed in position 2 the intermediate medium depth flat surface **226** is placed under the cam follower spring biased arm **174** and the cam follower bellcrank is permitted to rock through an angle halfway between that of a single line feed and a triple line feed, i.e., it will result in a double line feed. This selector mechanism is a very simple device for varying the length of line feed pawl power stroke, resulting in less work being performed for a single feed action than for a double or triple feed action. It is to be understood that more than the three variations of line feed could be accommodated merely by suitably shaping the line feed operating cam **144** and the cam flats on the selector cylinder **208**.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiment is therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

What is claimed and desired to be secured by Letters Patent is:

1. For use in a page record printer, a line feed mechanism for feeding a page record stepwise one or more lines spaces at a time including: page record engaging and feeding means; a ratchet wheel drivingly connected to said record engaging and feeding means; a ratchet wheel advancing pawl means pivotally mounted adjacent and in engagement with the teeth of said ratchet wheel; a selectively operable, power driven cycling means for imparting a power and a return stroke to said pawl means; and means to selectively vary the magnitude of return stroke of said pawl means to thereby control the magnitude of power stroke and work applied to said pawl means by said power driven cycling means and change the magninitude of line feed.

2. A line feed mechanism as defined in claim **1**, wherein said power driven cycling means comprises a start-stop power cam, and a pivotally mounted cam follower arm, spring biased toward said power cam and connected to rock said pawl means; and said means to selectively vary the magnitude of said pawl means return stroke includes a control member, having a plurality of abutment surfaces adapted to be selectively positioned in the return stroke path of a kinematic linkage which comprises said pawl means and said follower arm to block the return stroke movement of said pawl means at different magnitudes of return stroke.

3. A line feed mechanism as defined in claim **1**, wherein said power driven cycling means comprises: a power driven, continuously rotating shaft; a rotatable cam coaxially mounted relative to said power driven shaft; a selectively operable, solenoid controlled start-stop cycling clutch coupling said power driven shaft and said cam; and a cam follower pivotally mounted adjacent said cam for engagement by said cam and connected to said pawl means to enable rocking said pawl means to drive said ratchet.

4. For use in a page record printer, a page record line feed mechanism comprising: rotatable page record engaging and feeding member rotating means; a ratchet wheel coaxially, non-rotatably secured on said rotating means; a ratchet wheel advancing pawl means pivotally mounted adjacent and in engagement with the teeth of said ratchet wheel; a selectively operable, power driven cycling means for imparting a power and a return stroke to said pawl means; and means to selectively vary the magnitude of return stroke of said pawl means to thereby control the magnitude of power stroke and work applied to said pawl means by said power driven cycling means and change the magnitude of line feed; said power driven cycling means including a power driven, continuously rotating shaft, a rotatable cam with high and low dwells coaxially mounted relative to said power driven shaft, a selectively operable, solenoid controlled start-stop cycling clutch coupling said power driven shaft and said cam, a cam follower pivotally mounted adjacent said cam

and connected to said pawl means to rock said pawl means, and spring biasing means connected to said cam follower and biasing said cam follower toward said cam.

5. A line feed mechanism as defined in claim 4, wherein said cam follower is a bellcrank with a cam following means on one arm, its other arm being connected to said pawl means, and an abutment stop surface on one of said arms; spring means are connected to said bellcrank to bias its follower arm toward said cam; and said means to selectively vary the return stroke of said pawl means constitutes a selectively shiftable stop member located in the path of movement of said abutment stop surface in the direction biased by said spring means, different shifted positions of said stop member varying the limited position of the spring biased return stroke of said bellcrank and connected pawl means.

6. A line feed mechanism as defined in claim 5, wherein said shiftable stop member is a manually rotatable cylinder means having a plurality of surfaces located at different ditsances from the axis of said cylinder means

and shiftable into position to be abutted by said abutment surface by incremental rotation of said cylinder means.

7. A line feed mechanism as defined in claim 6, wherein a fixed support plate is provided to rotatably mount said cylinder means, said cylinder means is axially maintained with one end closely adjacent said plate, and detent means in said cylinder means and said plate cooperate to maintain selected positions of said cylinder means.

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