Jan. 23, 1945 B. S. SWEZEY 2,367,901

PRINTING TELEGRAPH APPARATUS

Filed April 12, 1944 2 Sheets-Sheet 1

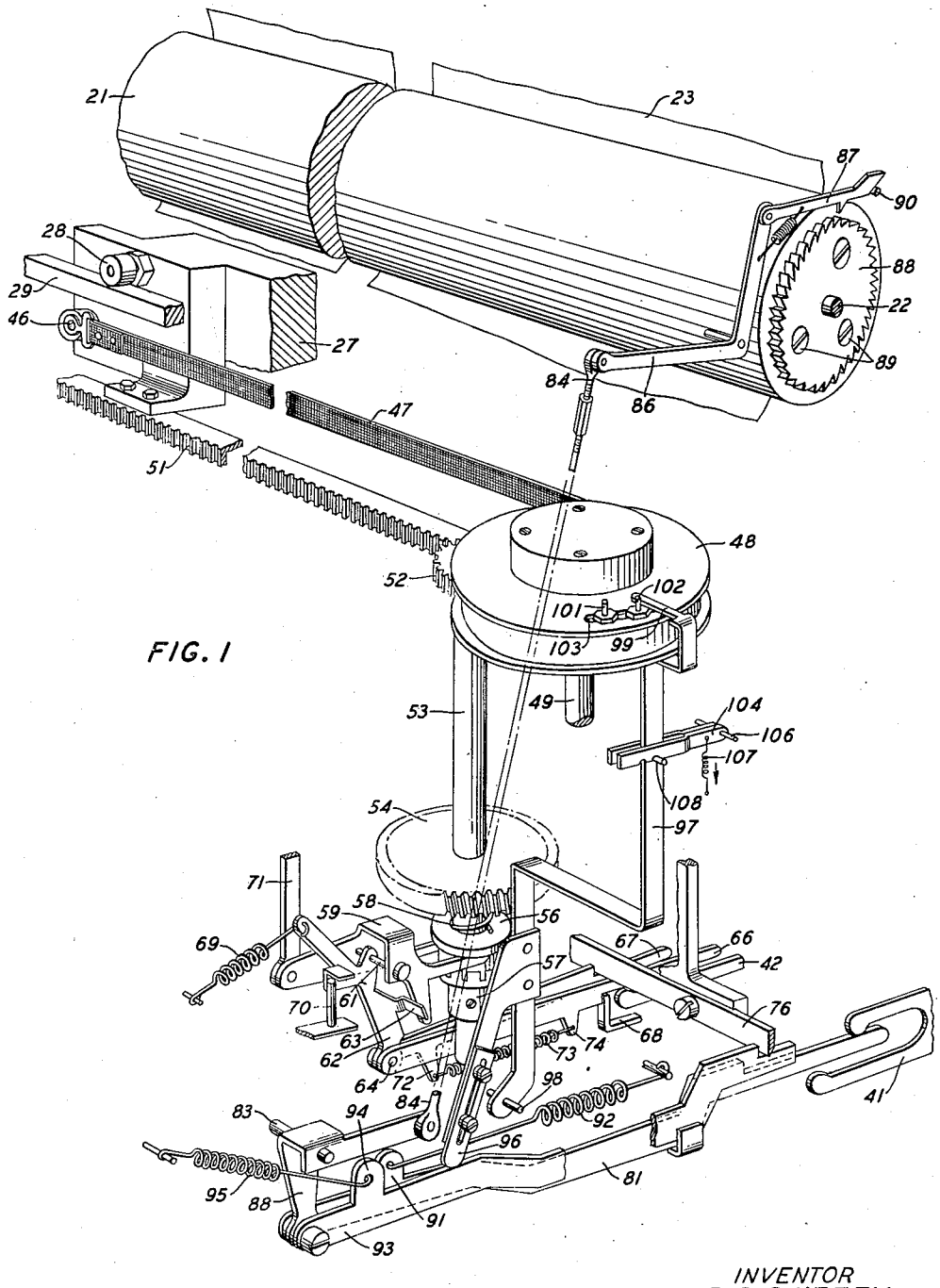

FIG. 1

INVENTOR
B. S. SWEZEY
BY
R. C. Terry
ATTORNEY

Jan. 23, 1945. B. S. SWEZEY 2,367,901

PRINTING TELEGRAPH APPARATUS

Filed April 12, 1944 2 Sheets-Sheet 2

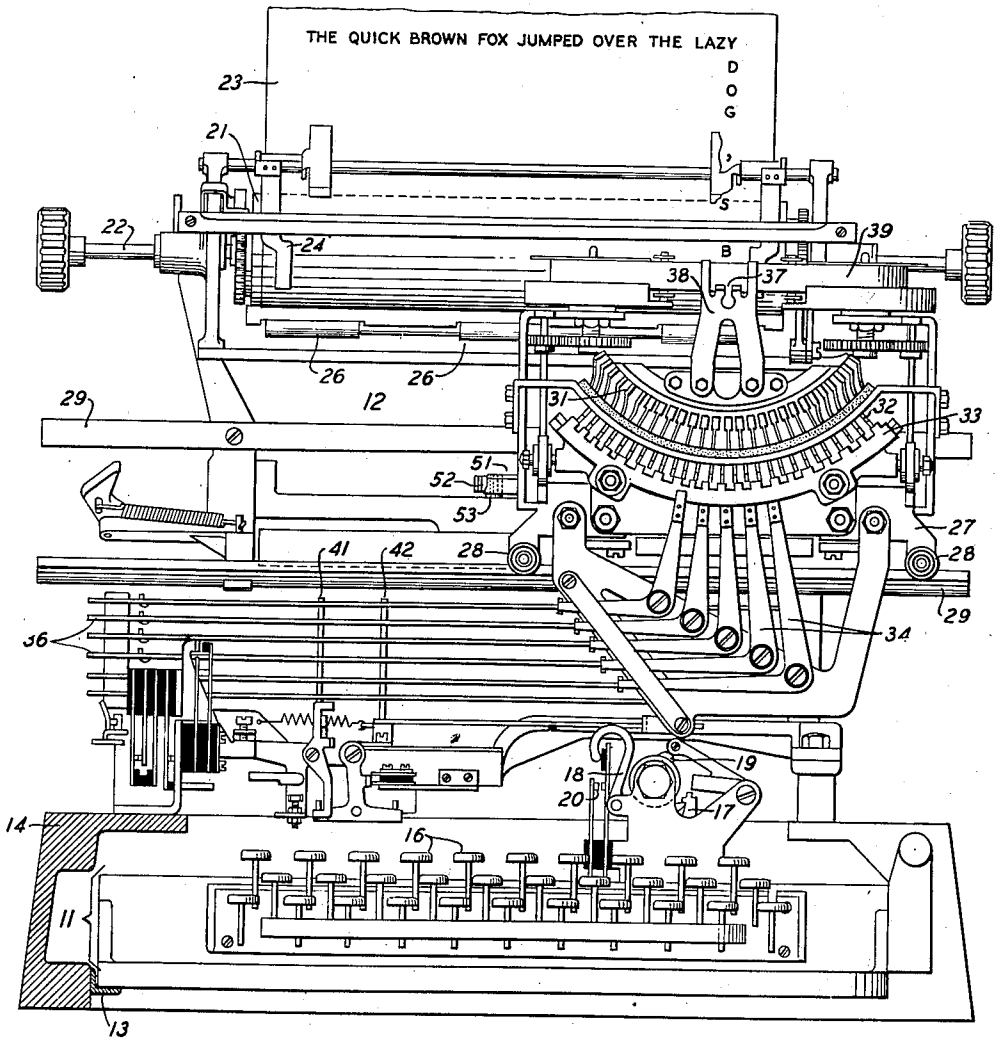

FIG. 2

INVENTOR
B. S. SWEZEY
BY
R. C. Terry
ATTORNEY

Patented Jan. 23, 1945 2,367,901

UNITED STATES PATENT OFFICE

2,367,901

PRINTING TELEGRAPH APPARATUS

Burdette S. Swezey, Floral Park, N. Y., assignor to Bell Telephone Laboratories, Incorporated, New York, N. Y., a corporation of New York

Application April 12, 1944, Serial No. 530,630

6 Claims. (Cl. 178—25)

This invention relates to printing telegraph recorders and particularly to printers which record received message material on page width paper.

An object of the invention is to prevent loss or mutilation of received message material whether by superimposed printing of characters one upon the other or by scattered printing of characters when loss of a carriage return signal or reception of that signal in mutilated form results in loss of a carriage return operation.

Another object of the invention is to introduce a line-feed operation incident to every receiving operation while the carriage of a page printer stands in the extreme end-of-line position, so as to cause characters to be printed in vertical alignment on the page.

As is well known, page printing teletypewriters require the performance of carriage return and line-feed operations when the carriage reaches its end-of-line position in order for received message material to be recorded in successive lines on the page. If the signals for effecting both of these operations are not transmitted or are lost or mutilated in transmission, so that they are incorrectly received, the characters thereafter received during the interval preceding the next carriage return and line-feed operations will be printed one upon another at the end-of-line position of the carriage, so that part or all of a line of received message material may be lost. If the carriage return signal is lost but the line-feed signal is received correctly, the page width paper upon which the message material is being recorded will be advanced one line-feed step, but the characters thereafter received will be printed one upon the other at the end-of-line position in the next line of the page and the message material will be lost.

It has heretofore been proposed to combine the line-feed and carriage return operations so that they shall be performed in response to one signal, instead of having each operation initiated in response to its own signal. It has also been proposed to cause the line-feed and carriage return operations to be performed automatically and without the reception of any signal specifically assigned to such operations, when the carriage reaches a predetermined or a determinable position near the limit of its travel. The carriage of a page printer usually has appreciable mass which resists starting the return movement of the carriage from its end-of-line position and which produces severe shocks and bounce effects when the carriage is arrested in the beginning-of-line position if it has been returned at extremely high speed. The carriage return operation is usually arranged to be performed as quickly as possible, having due regard for the inertia condition, but it has often been found necessary to allot to the carriage return operation an interval exceeding the interval of one receiving cycle of the printer. In such cases it is a usual operating routine to transmit the carriage return signal preceding the line-feed signal, in order that the carriage return operation may extend over into the interval allotted to the line-feed operation. In this way two full receiving intervals are allotted to the carriage return operation, and return of the carriage to the beginning-of-line position before the instant of occurrence of the recording of the next character is assured.

When carriage return and line-feed operations are made responsive to one signal, in printers in which the full carriage return operation requires more than one receiving cycle interval, the character represented by the next signal may be printed while the carriage is returning and before it has reached its beginning-of-line position. The line-feed operation will probably precede the printing of the character, so that the character will be printed at a point between the ends of the new line position. Thereafter as signals continue to be received and characters are typed in a line across the page, the character which was printed during the carriage return operation will probably have a subsequent character superimposed upon it and thus will be at least partly concealed and will be missing from its proper place at the beginning of the line. In many instances the loss of a character will not affect correct interpretation of the message, but it is possible that the word which remains and which should have had the lost character will have an entirely different meaning. Furthermore, if figures were being received and one should be printed out of place and concealed or partly concealed by overprinting, the resulting possible misinterpretation of the number from which the figure had been separated might have serious consequences. This condition may be alleviated by introducing an idle signal, such as a case shift signal corresponding to the shift condition in which the receiving printer is then operating, following the combined carriage return and line-feed signal, to afford the extra time required by the carriage return operation.

When carriage return and line-feed operations are performed automatically at the end of a line

in printers in which the full carriage return operation requires more than one receiving cycle interval, two characters may be printed before the carriage returns to its beginning-of-line position, one being superimposed upon some character in the completed line, before the line-feed operation has been performed and the other being printed in the new line position after the line-feed operation has been performed but before the carriage return operation is completed. Thus the two characters will be printed in two lines and both will have become lost and the text confused when, as signals continue to be received, the new line is typed.

In accordance with the present invention, the page printer has normal carriage return and line-feed function elements which may be jointly responsive to a signal representing the line-feed and carriage return operations, or which may be selectively responsive to their respective signals. In additon there is a special line-feed function element which is not controlled by the signal responsive selector mechanism of the printer, but is normally disabled and is activated into cooperative relation to the function bail of the printer when the carriage has reached its end-of-line position. If a carriage return signal is then received, the carriage will be restored to its beginning-of-line position and the special line-feed element will be redisabled. If on the other hand the carriage return signal is not transmitted or is lost or mutilated in transmission, and character signals continue to be received, the function bail, operating incident to each receiving cycle of the printer, will operate the special line-feed element to perform a line-feed function for each character received. Thus the characters will be typed at the end-of-line position in successive line spaces of the page so that they will appear in the order received in a vertical column at the right-hand side of the page. No characters will be superimposed one upon the other and the message may be read to the end of the line and then downwardly along the vertical column of characters and there will be no loss of message characters due to failure to receive the carriage return signal. When the next carriage return signal is received, the carriage will be restored to the beginning-of-line position, the special line-feed lever will be restored to the disabled condition and normal printing in a line transversely of the page will be resumed.

For a complete understanding of the invention, reference may be had to the following detailed description, to be interpreted in the light of the accompanying drawings wherein:

Fig. 1 is a schematic perspective view showing a preferred embodiment of the invention; and

Fig. 2 is a front elevational view showing a printing telegraph recorder adapted to include the present invention and showing a specimen page on which characters have been printed in the normal manner and under the influence of the present invention.

Referring now to the drawings and particularly to Fig. 2, the telegraph printer shown therein is a page printer of the type disclosed in Patent 1,904,164, granted April 18, 1933 to S. Morton et al. The disclosure of this patent is incorporated herein by reference as part of the present specification. It will be understood that the invention is not adaptable exclusively to the particular printer shown in Fig. 2 but that this printer is shown for purposes of illustration only and that the invention may be employed in any page printer. Since the printer shown in Fig. 2 is fully described in the aforementioned patent, only the fundamental elements and those details necessary to an understanding of the present invention will be identified in this specification.

The basic elements of the printing telegraph set shown in Fig. 2 are a keyboard transmitter unit 11 and a typing unit 12. Keyboard transmitter unit 11 is supported on rails 13, only one of which is shown, in a base member 14, and typing unit 12 is supported by the base member 14. Keyboard transmitter unit 11 has key levers 16 which control lock levers 17 which in turn control transmitting contact levers 18 jointly with cams contained in a transmitting cam assembly 19. The transmitting contact levers 18 control transmitting contacts 20.

Typing unit 12 supports at the top a cylindrical platen 21 which is secured to rotatable platen shaft 22. Extending around platen 21 is a page width paper 23 upon which characters representing message material are to be printed. Paper 23 is guided past the printing position by guide fingers 24 and is held in engagement with platen 21 by pressure rollers 26 so that when shaft 22 is rotated page 23 will be moved upwardly due to the frictional engagement of the page with platen 21 by pressure rollers 26.

In front of platen 21 a type basket carriage 27 is supported by rollers 28 on rails 29 for movement to and fro across platen 21 parallel to the axis thereof. Type basket carriage 27 supports type bars 31 which are articulated to selectable pull bars 32. The selection of pull bars 32 is controlled by permutationally notched code bars 33 which are engaged by the upwardly extending arms of bell crank levers 34 pivoted on type basket carriage 27. The horizontally extending arms of bell crank lever 34 terminate in bifurcated portions which straddle the edges of selector vanes 36.

Selector vanes 36 are controlled by a receiving distributor mechanism (not shown in the drawings but fully disclosed in the aforementioned patent) so as to be rocked to move their edges engaged by bell crank levers 34 upwardly or downwardly in accordance with received signals. As each selector vane is rocked to move its front edge upwardly or downwardly, its associated bell crank lever 34 is rocked clockwise or counterclockwise, respectively, to shift its associated code bar 33 rightwardly or leftwardly. By virtue of the bifurcated portion of each bell crank lever 34 straddling the edge of a selector vane 36, type basket carriage 37 may move to and fro along platen 21 with bell crank levers 34 remaining in operative engagement with the selector vanes 36. For each combinational setting of selector vanes 36 representing a character to be printed, the code bars 33 are so positioned that an alignment of notches is presented to one of the pull bars 32. Thereafter a printing bail (not shown) engages the pull bar which has been permitted to drop into the alignment of notches and by virtue of the articulation of the pull bars to the type bars 31 rocks the selected type bar up into a slot 37 in a type bar guide 38 and into engagement with an inked ribbon 39 disposed in front of and in close proximity to paper 23 carried by platen 21. In this way the character carried on the type pallet is printed on paper 23. For each printing operation type basket carriage 27 is moved rightwardly a distance of one

character space by mechanism hereinafter to be described in part.

In addition to controlling the selection of pull bars 32, the selector vanes 36 also control the selection of function levers 41 and 42. As is fully disclosed in the Morton patent the function levers are pivotally mounted at the rear of the selector vanes 36 and are provided with notches and lugs coded with respect to the selector vanes so that when the vanes are set in a characteristic position representing the selection of one of the function levers, the rear edges of the selector vanes are out of alignment with all of the lugs carried by that selector lever and are in alignment with notches therein, so that the selector lever is free to rock toward the selector vanes 36.

In Fig. 1 the platen 21 is shown as viewed from the rear of the printer and a fragment of type basket carriage 27 is shown with one of its rollers 28 resting on supporting rail 29. Carriage 27 has secured thereto a pin 46 to which is attached one end of a carriage return strap 47. Strap 47 is wrapped around and has its other end secured to a drum 48 rotatably supported on shaft 49 mounted in a stationary portion of the frame of typing unit 12. Drum 48 contains a coil spring (not shown) tending to rotate drum 48 in a clockwise direction.

Type basket carriage 27 also has secured thereto a rack 51 which meshes with a pinion 52 secured to a shaft 53. Shaft 53 has journaled thereon a gear 54 to which is keyed a driving portion 56 of a jaw clutch. The driven portion 57 of the clutch is fixed to shaft 53. The driving portion 56 of the clutch is slidable axially of shaft 53 and is urged away from gear 54 and into engagement with driven portion 57 by a compression spring 58.

A clutch fork lever 59 is pivoted at 61 and engages driving clutch portion 56 at diametrically opposed points for lifting the driving clutch portion out of engagement with the driven portion 57. An operating lever 62 for the clutch fork lever 59 is also pivoted at 61 and is provided with a lug 63 for engaging an arm of clutch fork lever 59 to rock the clutch fork lever in counter-clockwise direction. The operating lever 62 for the clutch fork lever 59 has pivoted thereto at 64 a latch bar 66 and a restoration bar 67. Latch bar 66 is undercut to provide a shoulder which normally rests against latch 68 and the latching shoulder is urged into engagement with the latch by a spring 69 which applies a counter-clockwise torque to lever 62.

In the normal condition of the apparatus, latch bar 66 is latched by the latch 68 and lever 62 is held in extreme clockwise position thereby permitting spring 58 to hold driving clutch portion 56 in engagement with driven clutch portion 57. Gear 54 is driven through a small angle by means fully disclosed in the Morton et al. patent for each character spacing operation, and the movement of gear 54 is imparted through the clutch and shaft 53 to pinion 52 which moves rack 51 a distance representing one character space, thereby moving type basket carriage 27. As the type basket carriage is moved by gear 54, strap 47 is unreeled a corresponding amount from drum 48, thereby increasing the tension of the spring contained therein.

When a carriage return signal is received, the function lever 42 is selected by the selector vanes 36 and is operated. An arm of function lever 42 is disposed beneath the free end of latch bar 66 and this arm lifts the latching shoulder of bar 66 free of latch 68 thereby permitting spring 69 to rock lever 62 in counter-clockwise direction until arrested by stop pin 70, as a result of which clutch fork lever 59 is rocked in counter-clockwise direction, spring 69 being stronger than clutch spring 58. In this way the driving portion 56 of the clutch is disengaged from the driven portion 57, freeing shaft 53. Thereupon, the spring contained in drum 48 rotates the drum in clockwise direction, rewinding strap 47 and thereby restoring type basket carriage 27 to its beginning-of-line position.

Clutch fork lever 59 has articulated thereto a link 71, a fragment of which is shown in Fig. 1 which extends to latching mechanism (not shown) for holding the jaw clutch comprising members 56 and 57 disengaged. As is fully disclosed in the Morton et al. patent the latching mechanism for link 71 is released by the type basket carriage 27 upon its return to the beginning-of-line position. This latching and latch releasing arrangement assures that the type basket carriage 27 shall have returned to its extreme beginning-of-line position before driving clutch member 56 can be reengaged with driven member 57.

The restoration bar 67 has a downwardly extending ear 72 which is connected by spring 73 to an ear 74 associated with latch bar 66. Spring 73 imparts a counter-clockwise torque to restoration bar 67 about its pivotal mounting 64 and urges the over-cut portion of reset bar 67 at its free end into engagement with a function bail 76. The over-cut portion of reset bar 67 provides a shoulder which function bail 76 may engage for moving restoration bar 67, and with it the latch bar 66, leftwardly as viewed in Fig. 1 to relatch the latch bar 66 on latch 68. When latch bar 66 is in the latched condition the shoulder of restoration bar 67 occupies a position slightly to the right of the left-hand limit of movement of function bail 76 and each time the function bail 76 operates it imparts a slight leftward movement to latch bar 66 and reset bar 67 and a slight clockwise movement to lever 62. These movements do not release latch bar 66 from latch 68 nor do they disturb clutch fork lever 59. Upon the release of latch bar 66 from latch 68 as previously described under the control of function lever 42, spring 69 operating through lever 62 moves latch bar 66 and restoration bar 67 rightwardly, at least partially closing the gap between the shoulder of restoration bar 67 and function bail 76. The function bail is operated in each receiving cycle of the printer and accordingly it is moved leftwardly and engages the shoulder of restoration bar 67, moving that bar and latch bar 66 leftwardly a sufficient distance to relatch the latch bar 66 on latch 68. Lever 62 is thus restored to clockwise position, withdrawing arm 63 of lever 62 from engagement with clutch fork lever 59, which remains in the extreme counter-clockwise position under the control of the latching mechanism for link 71 previously mentioned. By virtue of the prompt restoration of lever 62 to clockwise position by bail 76 and the delayed reengagement of the driving and driven portions of the jaw clutch under the control of the latching mechanism for link 71, the restoration of the type basket carriage 27 to beginning-of-line position by drum 48 is assured.

Function lever 41 controls the line-feed func-

tion of the printer. An arm of this lever is disposed beneath the over-cut free end of a line-feed bar 81. This bar is connected to a bell crank lever 82 pivoted at 83. The other arm of bell crank lever 82 is connected by a link 84 to one arm of a bell crank lever 86 the other arm of which carries a line-feed pawl 87. Pawl 87 cooperates with a ratchet 88 secured to platen 21 by means of screws 89. When line-feed function lever 41 is selected by selector vanes 36, it lifts the free end of line-feed bar 81 to bring the shoulder provided by the over-cut portion into the path of function bail 76. Thereafter the function bail moves leftwardly and in turn moves line-feed bar 81 leftwardly, rocking bell crank lever 82 in clockwise direction. Bell crank lever 82 draws link 84 downwardly and rocks bell crank lever 86 in counter-clockwise direction, thereby causing pawl 87 to move clear of supporting pin 90 and to drop into engagement with ratchet 88 so as to rotate ratchet 88 and platen 21 in counter-clockwise direction as viewed in Fig. 1 a distance equal to the printing line spacing. Line-feed function bar 81 is provided with an ear 91 to which is connected one end of a tension spring 92, the other end of which is connected to a fixed spring post. Spring 92 restores function bar 81 to the normal or extreme right-hand position as viewed in Fig. 1 when function bail 76 returns to the normal position.

A special line-feed function bar 93 is also pivoted to line-feed bell crank 82. This function bar is provided with an ear 94 to which is connected one end of a tension spring 95, the other end of which is connected to a spring post. Spring 95 extends in such direction that it imparts a counter-clockwise torque to special line-feed function bar 93 and tends to lift a shoulder provided by the over-cut portion at the free end of function bar 93 into the path of function bail 76. Spring 95 is considerably weaker than spring 92 so that the component of the force exerted by spring 95 in direct opposition to spring 92 does not prevent the latter spring from restoring function bars 81 and 93 to their normal rightward positions.

Special line-feed function bar 93 is normally held depressed by adjustable arm 96 of lever 97, so that the shoulder of bar 93 is below the operating path of function bail 76. Lever 97 is pivoted at 98 and is provided with a laterally extending finger 99 at its upper end which overlies the top of carriage return spring drum 48 in close proximity thereto. The upper face of drum 48 is provided with adjacent pins 101 and 102 adjustably mounted in slot 103. Pin 102 is so positioned on drum 48 that when type basket carriage 27 has about reached its extreme end-of-line position and drum 48 has been rotated in counter-clockwise direction due to the unreeling of strap 47, pin 102 comes into engagement with finger 99 of lever 97 and rocks the lever in clockwise direction. This causes the lower end of arm 96 of lever 97 to move upwardly in an arc, the direction of which is nearly vertical, thus permitting spring 95 to rock special line-feed function bar 93 counter-clockwise to bring the operating shoulder of bar 93 into the path of function bail 76. Line-feed function bar 93 remains in operative relation to function bail 76 as long as type basket carriage 27 remains in the end-of-line position and in each receiving cycle of the printer, function bail 76 will operate function bar 93 which in turn will operate bell crank lever 82 and rotate platen 21 one line-feed step. The characters selected for printing in these cycles will be printed in vertical alignment at the right-hand side of page 23 as shown in Fig. 2. A detent lever 104 pivoted at 106 and urged in counter-clockwise direction by spring 107 has two notches for engaging a pin 108 carried by lever 97 and when lever 97 is rocked to its clockwise position to permit function bar 93 to be operated, the right-hand notch in detent lever 104 engages pin 108 and holds lever 97 in its clockwise position.

Since a line-feed operation is performed in every receiving cycle under these circumstances, it will be performed accompanying each word spacing operation, so that words will be separated by an extra line space, and thus will be set off from each other as in normal printing in horizontal lines. Line-feed operations will accompany other functions. such as shift and unshift. These functions must respectively precede and follow the selection of figures and of marks of punctuation. The only mark of punctuation ordinarily occurring between letters of a word is the apostrophe. In this case the apostrophe will be printed two line spaces below the letter it follows, the extra line space being introduced accompanying the shift function, and the letter following the apostrophe will be printed two line spaces below the apostrophe, the extra line space being introduced accompanying the unshift function. In like manner, extra line spaces will precede and follow other marks of punctuation, such as period, comma, and interrogation point. These extraordinary spaces do not render reading of the printed copy difficult.

Upon the reception of a carriage return signal, the clutch comprising driving member 56 and driven member 57 will be disengaged in the manner hereinbefore described to permit carriage return spring drum 48 to rotate in clockwise direction and restore type basket carriage 27 to its beginning-of-line position. As the carriage reaches this position, pin 101 carried by drum 48 engages the right-hand side of finger 99 of lever 97 and rocks the lever to its counter-clockwise position, moving pin 103 into the left-hand notch in detent 104, which detents lever 97 in this position. As lever 97 is moved to its counterclockwise position, arm 96 of the lever depresses special line-feed function lever 93 to its normal position with its operating shoulder out of operative relation to function bail 76. The performance of line-feed functions accompanying each receiving cycle is therefore stopped and lever 97 remains in the extreme counter-clockwise position until it is again operated to the clockwise position by pin 102.

With the special line-feed function mechanism hereinbefore described, characters will not be printed in superimposed relation at the end of a line if the carriage return signal is lost, but will instead be printed in a vertical column as shown on paper 23 in Fig. 2. The message material may then be read from left to right to the end of the line and then downwardly and none will be lost or mutilated.

Although a specific embodiment of the invention has been shown in the drawings and described in the foregoing specification, it will be understood that the invention is not limited to this specific embodiment but is capable of modification and rearrangement without departing from the spirit of the invention and within the scope of the appended claims.

What is claimed is:

1. In a printing telegraph apparatus adapted to record characters in transverse lines on a record medium, a carriage movable for character spacing, means for feeding said record medium in steps for line spacing, and means rendered effective when said carriage reaches its end-of-line position for causing said feeding means to be operated incident to each character recording operation whereby to record successively received characters in vertical alignment on said medium.

2. In a printing telegraph apparatus adapted to record characters in transverse lines on a record medium, a carriage movable for character spacing, means for feeding said record medium in steps for line spacing, means rendered effective when said carriage reaches its end-of-line position for causing said feeding means to be operated incident to each character recording operation whereby to record successively received characters in vertical alignment on said medium, and means for disabling said last-mentioned means when said carriage is returned to its beginning-of-line position.

3. In a page printing telegraph apparatus a platen supporting a page adapted to have characters recorded thereon, normally disabled means for rotating said platen to effect line spacing, cyclically operable means for operating said platen rotating means, a carriage movable for character spacing, and means controlled by said carriage upon reaching its end-of-line position for enabling said platen rotating means to cooperate with said cyclically operated means whereby to cause characters corresponding to signals thereafter received to be recorded in vertical alignment along a margin of said page.

4. In a page printing telegraph apparatus, a platen supporting a page adapted to have characters recorded thereon, means including a reciprocable bar for rotating said platen to effect line spacing, cyclically operable means for operating said bar, means for normally holding said bar out of operative relation to said operating means, a carriage movable for character spacing, and means controlled by said carriage upon reaching its end-of-line position for disabling said holding means whereby to cause said bar to be operated by said operating means in each subsequent cycle of operation thereof for spacing subsequently recorded characters vertically along the margin of said page.

5. In a page printing telegraph apparatus, a platen supporting a page adapted to have characters recorded thereon, means including a reciprocable bar for rotating said platen to effect line spacing, cyclically operable means for operating said bar, means for normally holding said bar out of operative relation to said operating means, a carriage movable for character spacing, means controlled by said carriage upon reaching its end-of-line position for disabling said holding means whereby to cause said bar to cooperate with said operating means in subsequent operating cycles thereof for spacing subsequently recorded characters vertically along a margin of said page, and means controlled by said carriage upon restoration thereof to the beginning-of-line position for reenabling said holding means.

6. In a page printing telegraph apparatus, a platen supporting a page adapted to have characters recorded thereon, means including a signal responsive instrumentality and a non-signal responsive instrumentality for rotating said platen to effect line spacing of said page, cyclically operable means for engaging either said signal responsive instrumentality or said non-signal responsive instrumentality to effect operation thereof, means for normally holding said non-signal responsive instrumentality out of operative relation to said operating means, a carriage movable for character spacing, means controlled by said carriage upon reaching its end-of-line position for disabling said holding means whereby to cause operation of said platen rotating means by said operating means in each subsequent operation thereof so as to record subsequently received characters in vertical alignment along a margin of said page, and means controlled by said carriage upon restoration thereof to the beginning-of-line position for reenabling said holding means.

BURDETTE S. SWEZEY.