May 10, 1955 B. F. MADSEN 2,708,217

AUTOMATIC CARRIAGE RETURN

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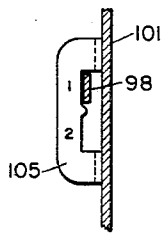


FIG. 3

FIG. 4

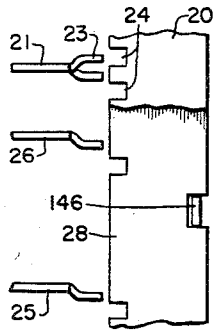


FIG. 2

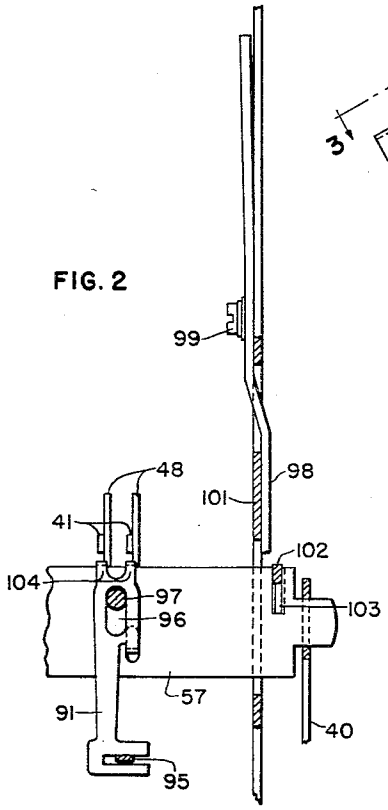


FIG. 1

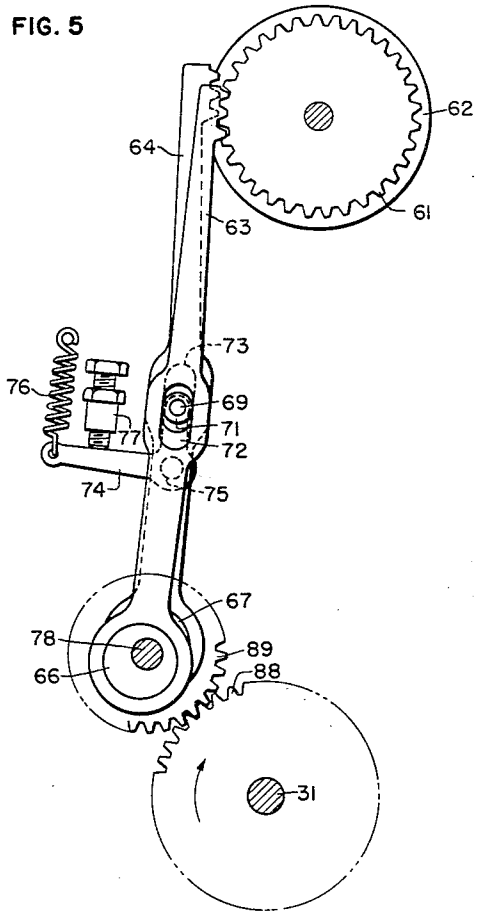
INVENTOR.
BERTHEL F. MADSEN
BY Emery Robinson
ATTORNEY

May 10, 1955 B. F. MADSEN 2,708,217

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FIG. 5



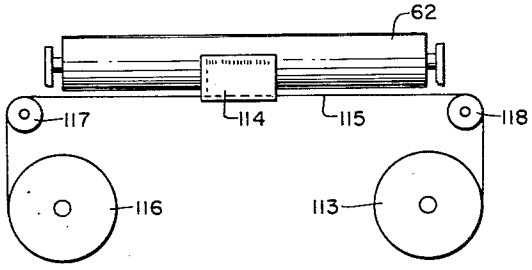


FIG. 6

INVENTOR
BERTHEL F. MADSEN
BY Emery Robinson
ATTORNEY

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AUTOMATIC CARRIAGE RETURN

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FIG. 7

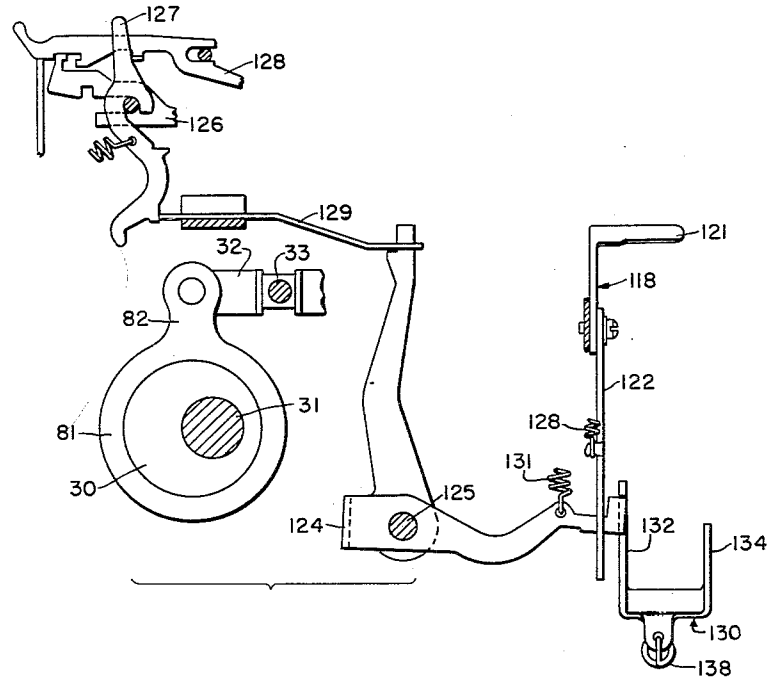
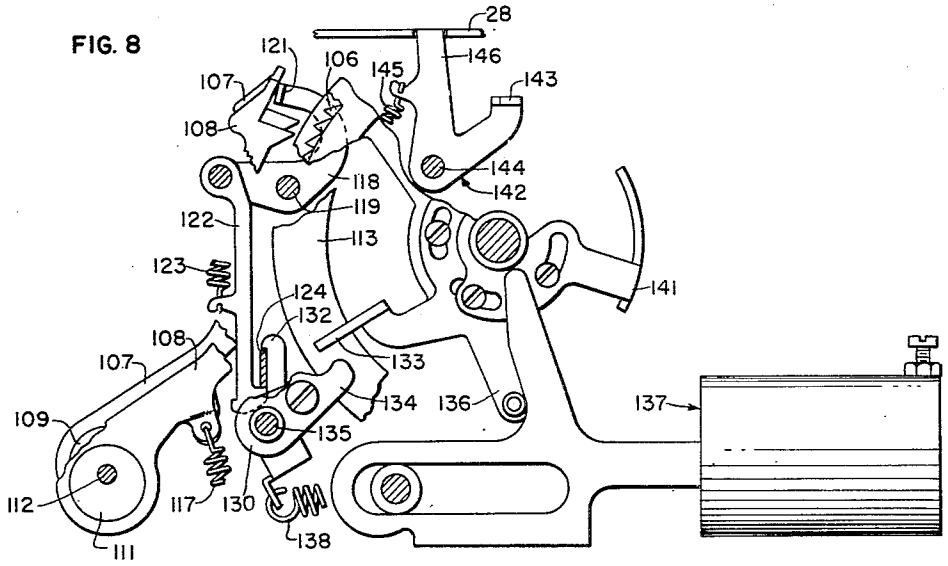


FIG. 8



INVENTOR
BERTHEL F. MADSEN
BY Emery Robinson
ATTORNEY

United States Patent Office 2,708,217 Patented May 10, 1955

2,708,217

AUTOMATIC CARRIAGE RETURN

Berthel F. Madsen, Chicago, Ill., assignor to Teletype Corporation, Chicago, Ill., a corporation of Delaware

Application December 6, 1951, Serial No. 260,151

5 Claims. (Cl. 178—25)

This invention relates to printing telegraph apparatus and more particularly to improvements in function controlling mechanisms therefor.

The present invention contemplates the effectuation automatically of the carriage return and line feed functions simultaneously in a printer substantially of the type shown in United States Patent No. 2,505,729, issued April 25, 1950 to W. J. Zenner, by controlling a special code bar from the spacing mechanism, which code bar acts to control the simultaneous performance of the carriage return and line feed operations.

The invention features in a page printer having a movable carriage and a rotatable platen, an automatic carriage return and line feed mechanism which is controlled by the spacing drum and comprises a bell crank operated at a predetermined spacing position by the spacing drum to shift a special code bar that controls the selection simultaneously of a line feed function bar and a carriage return function bar which through their respective function pawls and levers cause the carriage return and line feed functions to occur simultaneously.

The primary object of the invention is to provide in a page printer an improved means for effecting automatically the simultaneous operations of the carriage return and line feed mechanisms upon the arrival of the character spacing mechanism at a predetermined operative position relative to the positionment of the movable carriage.

The foregoing and other objects of the invention will be more apparent in the following detailed description of the invention when taken in conjunction with the accompanying drawings, wherein:

Fig. 1 is a transverse cross sectional view of the selective control unit taken substantially at the position of the line feed function lever;

Fig. 2 is a fragmental rear view of the selective control unit showing the single and double line feed arrangement;

Fig. 3 is a cross sectional view taken on line 3—3 of Fig. 1;

Fig. 4 is a sectional view taken substantially on line 4—4 of Fig. 1;

Fig. 5 is an elevational view of the line feed mechanism;

Fig. 6 is a schematic elevational view of a printer embodying the mechanism according to the present invention;

Fig. 7 is a fragmentary side elevational view of the carriage return mechanism, and

Fig. 8 is a front elevational view, in part broken away, of the carriage return mechanism.

Having reference to Fig. 1, there is shown the basic function mechanism with which the carriage return and line feed mechanisms according to the present invention are associated. This basic function mechanism is located in the receiving page printers at all outlying stations. For a more thorough description of the printer with which the basic function mechanism shown in Fig. 1 is designed to be used, reference should be had to United States Patent No. 2,505,729, the disclosure of which is incorporated herein by reference. Reference may also be had to copending application Serial No. 250,056 filed October 6, 1951 by W. J. Zenner, covering the basic function mechanism.

A set of code bars, indicated generally by the numeral **20**, is suitably mounted within the printer, which code bars are comparable to code bars **62** to **70** of said Patent No. 2,505,729. Certain of said code bars **20** are movable longitudinally to one of two positions in accordance with the marking and spacing impulses of the well known Baudot code. Other of said code bars **20** are shifted longitudinally under predetermined operating conditions, as will hereinafter appear. A plurality of function bars **21** are suitably mounted in the apparatus with respect to the code bars **20**, and are urged to the right (as viewed in Fig. 1) towards the code bars **20** by means of springs **22** individual to each function bar. Each function bar **21** has a plurality of code projections **23** which cooperate with code notches **24** in each of the code bars **20**, in well known manner. As will appear hereinafter, certain of the function bars, for example **25** and **26** are provided with only a single code lug or projection **27** adapted to cooperate with an automatic carriage return and line feed code bar **28** (Figs. 1 and 4).

A power shaft **31** carries thereon an eccentric cam **30** (Fig. 7). A collar **81** is mounted rotatably on the eccentric **30** and has an arm **82** by which the cam **30** is attached pivotally to a lever **32** supported pivotally on a stationary shaft **33**. A bail **34** (Fig. 1) has a pair of arms **35** which are mounted pivotally on a stationary shaft **36**. A pair of toggle links **37** are secured pivotally at **38** to the arm **35**, and are secured at the other ends thereof to pivots **40** to which the lever **32** is also secured. As the shaft **31** rotates, the lever **32** is oscillated about the shaft **33** to thereby through the toggle links **37**, oscillate the bail **34**.

A function pawl **41** has an elongated slot **42** by means of which the function pawl **41** is mounted for longitudinal movement on a shaft **43**. A spring **44** continuously urges the function pawl **41** to the right (Fig. 1) and counterclockwise about the shaft **43**. The function pawl **41** has a latching shoulder **45** which cooperates with a shoulder **46** on the function bar **21**. Normally the latch **45** rides on the top of the shoulder **46** (as illustrated in Fig. 1) thereby permitting the spring **44** to retain the function pawl **41** in its rightward position. A function operating lever **48** is mounted pivotally on a shaft **49** and cooperates with a laterally directed portion **51** on the function pawl **41**. The function operating lever **48** is biased in a clockwise direction by a spring **52**. Associated with the lower end of the function operating lever **48** is an interponent member **54** the purpose of which will be described hereinafter. Interponents **54** are slidably carried in a guide bracket **55**.

Assuming that the permutation of positions of the code bars **20** has been set up which corresponds to the function bar **21**, the bail **34** moves to the right and all of the projections **23** are opposite notches **24**. The spring **22** is thereby permitted to move the function bar **21** to the right, the projections **23** entering the notches **24**, and the shoulder **46** underriding the latching shoulder **45** to thereby engage said latching shoulder **45** due to the action of spring **44** upon function pawl **41**. Thereafter as the bail **34** moves back to the left during its return stroke it moves the function bar **21** also, the function bar **21** in turn moving the function pawl **41** to the left. As the function pawl **41** moves to the left in this manner, the lateral projection **51** thereon engages and pivots the function operating lever **48** counterclockwise against the action of spring **52**, thereby causing the interponent **54** to be thrust rightwardly (as viewed in Fig. 1).

During the above-mentioned selective operation of function bar 21, the function pawl 41 was shifted from its solid line position to the dotted line position 56 over a vertically reciprocating bail member 57. Thereafter, as a new selection is being made in the code bars 20, the bail 57 moves upwardly to strip or disengage the function pawls 41 from latching engagement with their corresponding function bars 21. Stripper bail 57 is reciprocated vertically by suitable camming instrumentalities associated with the shaft 31 through links 40.

Having reference to Fig. 5, the line feed mechanism contemplated herein is of the type disclosed in copending application Serial No. 210,910, filed February 14, 1951 now U. S. Patent No. 2,667,256 dated January 26, 1954 by B. F. Madsen, and comprises a gear 61 fixedly related to the platen 62 of the printer, and a pair of drive or rack members 63 and 64. The gear 61 rotates with the platen 62 and the rack members 63 and 64 are adapted to be alternately engageable with the teeth on the gear 61, with a slight overlap of engageability being provided, so as to impart rotative motion to the gear 61 and platen 62. The rack members 63 and 64 are connected to eccentrics 66 and 67, respectively, which are operatively related to the line feed clutch 60 (Fig. 1) hereinafter described. Power for operating said racks 63 and 64 is derived from the main shaft 31 through said clutch 60. The eccentrics thus control the reciprocatory motion of the rack members 63 and 64. As shown in Fig. 5, the rack members 63 and 64 are adapted to be rocked on a movable pivot 69 comprising a roller 71 cooperable with slots 72 and 73 in said rack members 63 and 64. The pivot roller 71 is carried on the vertical arm of a bell crank lever 74 pivotally mounted on a pivot stud 75 fixed to the side frame of the apparatus. The bell crank 74 is normally biased clockwise about pivot 75 by a spring 76 against an adjustable stop 77.

Upon rotation of the eccentrics 66 and 67, a combination of rocking motion about pivot 69 and vertically reciprocating motion is imparted to the rack members 63 and 64. When the rack members 63 and 64 are rotated clockwise about the pivot roller 71 by their respective eccentrics 66 and 67, the teeth on the rack members 63 and 64 will engage the teeth of gear 61. To permit the rack teeth to mesh with the gear teeth under pressure, the fulcrum or pivot roller 71 is made movable so that slight counterclockwise movement is imparted to bell crank 74, thus increasing the tension of spring 76.

As viewed in Fig. 5, the eccentrics 66 and 67 are rotative in a counterclockwise direction. When the long radius of eccentric 66 is operative to the left of the vertical center line of the shaft 78, the rack member 63 is actuated clockwise about pivot 69 to bring the rack teeth into engagement with the gear 61. The rack member 63 is also actuated downwardly to impart counterclockwise rotation to the gear 61, hence to platen 62. Then, when the long radius of eccentric 66 is operative to the right of said vertical center line, the rack member 63 is actuated counterclockwise about pivot 69 to disengage the rack teeth from the gear 61. The rack member 63 is further actuated upwardly with the teeth thereon free of the gear 61. The same actions are imparted to the rack member 64 by the eccentric 67 except that they occur alternatively, thereby imparting smoothly accelerated and decelerated movement to the gear 61.

In the performance of the line feed operation, the line feed code signal is received by the selector mechanism, such as described in said Patent No. 2,505,729, to effect a setting of the code bars 20 to select the line feed function bar 21 (similar to bar 39 shown in Fig. 29 of Patent No. 2,505,729). Pursuant to the receipt of the line feed code signal, the bail 34 will be oscillated, whereupon the function bar 21 will be reciprocated to permit shoulder 46 to engage the step 45 of the pawl 41. Then upon leftward movement of the function bar 21, the lever 48 will be rotated counterclockwise to force the interponent 54 rightwardly.

Cooperating with the interponent 54 is an arm 83 of a clutch trip lever 84, the other arm 85 of which is provided with a stop portion 86 adapted to coact with a laterally directed stop projection 87 on the stop disc 90 of the three-stop line feed clutch 60, which is operatively related (frictionally or otherwise) in well known manner to the power shaft 31. The clutch trip lever 84 is normally biased counterclockwise by a spring 80 and is held against a stop 79. The line feed gearing is such that each one-third revolution of the clutch will advance the platen by one line. That is, each one-third revolution of the line feed clutch 60 causes its attached spur gear 88 (Fig. 5) to rotate the line feed eccentric spur gear 89 and its attached eccentrics 66 and 67 one-half revolution. Therefore, the length of time that the line feed clutch trip lever 84 is held away from the clutch will determine the number of line feeds that occur. In the embodiment shown, the timing relationship between the cycle of the stripper blade 57 and the rotation of the main shaft 31 is such that the function pawl (exemplified by pawl 41) is not stripped or disengaged from the function bar (21, 25, etc.) until after more than one-third of a revolution of the clutch 60 has occurred. Thus, in the present illustration, the line feed clutch trip lever 84 will stop the clutch 60 after two-thirds of a revolution, or double line feed has occurred.

Accordingly, when single line feed is desired, it is necessary to strip or disengage the function pawl 41 from the line feed function bar 21 before the line feed clutch 60 completes one-third of a revolution. This is accomplished by the use of an auxiliary line feed function pawl stripper 91 (Figs. 1 and 2). The aforementioned stops 87 are integral with the stop disc 90 which is also provided with three similar cam contours on its periphery. Cooperating with said cam contours on disc 90 is a cam follower lever arm 92 mounted pivotally at 93 and normally spring urged against said periphery by spring 94. Integral with the follower arm 92 is an extension or stripper bail 95 which is articulated to the stripper 91. Stripper 91 is driven by the stripper bail 95. The combination cam and stop disc 90 on the three-stop line feed clutch furnishes the motive force to operate the stripper bail 95 once each one-third revolution of the line feed clutch 60.

The stripper 91 is slidably carried on the stripper blade 57 through the instrumentality of slot 96 and stud 97. The stripper blade 57 on which the slotted line feed function pawl stripper 91 resides may be shifted toward the right or left by the camming action of the single and double line feed control lever 98, mounted pivotally at 99 on the printer side plate 101. The camming end 102 of the control lever 98 cooperates with a slot or notch 103 in the stripper blade 57 is such a manner that the lever 98 when pivoted about pivot 99 in a counterclockwise direction (as viewed in Fig. 1) the stripper blade 57 will be shifted leftwardly (as viewed in Fig. 2) in which position the vertically projecting ears 104 will not be presented directly below the pawls 41, in which event the pawls 41 will not become disengaged from their respective function bars 21–25 until the stripper blade 57 operates, which as previously mentioned, is not until after more than one-third of a revolution of the clutch 60 has occurred. Thus, in this position, double line feed is obtained.

Now, when the lever 98 is returned to the position shown in Fig. 1 the blade 57 is shifted rightwardly to the position shown in Fig. 2, to position the ears 104 under the pawls 41. Then when the line feed signal is received, and the lever 48 is actuated, the interponent 54 will trip the clutch 60 as before. However the bail 92—95 will be oscillated during the first one-third revolution of the cam disc 90 (and hence clutch 60) as before, but since the ears 104 are presented directly below the pawls 41, said pawls 41 will be immediately tripped or disengaged from their respective function bars

during one-third revolution of clutch **60** to effect a single line feed movement, instead of a double line feed; it being recalled that for each one-third rotation of clutch **60** (and hence gear **88**) gear **89** rotates one-half revolution, and moreover, for each one-half revolution of gear **89** the pawls **63** or **64** will effect a single line feed movement. The lever **98** cooperates with a two-position detent bracket **105** secured to side plate **101** (Fig. 3).

Having reference to Fig. 8, the character spacing mechanism is exemplified by a spacing ratchet **106** and a pair of driving pawl members **107** and **108**. The pawl members **107** and **108** are connected to eccentrics **109** and **111**, respectively, which are mounted on a cross shaft **112**. Power for operating the cross shaft **112** is derived from the main shaft **31** through a spacing clutch comparable to clutch **108** shown in Figs. 29, 31, and 32 of said United States Patent No. 2,505,729.

The spacing ratchet **106** is integral with and rotates the drum or pulley **113**, Fig. 6, comparable to pulley **362** shown in Fig. 25 of said Patent No. 2,505,729, around which the strap or cable **444** is wound to effect character spacing movement of the type carrier **114** (Fig. 6). To effect this movement in the embodiment shown in Fig. 8, the pawl members **107** and **108** are adapted to be alternatively effective in a forward driving action to impart rotative motion to the ratchet member **106**.

In Fig. 6 is illustrated schematically an arrangement showing the application of the invention to a printer; of the type, for example, shown in said Patent No. 2,505,729. The strap **115** is adapted to be wound around a carriage return drum **116**, and extends around the idler pulleys **117** and **118** to the spacing drum **113**. Fixed to the strap **115** is the movable type carriage **114** adapted to cooperate with a fixed platen **62**. With the arrangement according to the invention forward spacing is accomplished in a step-by-step manner, and normal carriage return is also contemplated. The forward spacing (clockwise) imparted to drum **113** tends to wind up the carriage return spring in the carriage return drum **116**. In the normal operation of the forward spacing mechanism, the shaft **112** rotates 180° during each spacing cycle so that the pawls **107** and **108** are effective alternatively to move the type carriage one character space; that is, from the position shown in Fig. 8 the pawl **108** is in readiness to step the spacing ratchet wheel **106** one angular step in a clockwise direction commensurate with character spacing, while the pawl **107** is retracted one step. Then upon the next one-half rotation of the shaft **112**, the pawl **108** accomplishes the spacing movement, while the pawl **107** is slid back over the ratchet teeth in readiness for its next effective movement. During the forward spacing operation, the pawls **107** and **108** are constantly engaging the periphery of the ratchet wheel **106** due to the pull of individual springs **117**. That is, when the pawls **107** and **108** are drawn back to pick up the next tooth, the pawls merely ride over the ratchet teeth, and are not lifted therefrom during normal forward spacing operations. However, the pawls **107** and **108** are lifted from the ratchet as indicated in Fig. 8, during the carriage return operation which will now be described.

Having reference to Fig. 8, the spacing pawls **107** and **108** are normally operative alternatively to effect through the ratchet wheel **106** clockwise rotation of the spacing drum step-by-step for character spacing. Cooperating with the pawls **107** and **108** is a bell crank member **118** mounted pivotally on a stud **119**. Member **118** is provided with a laterally directed portion **121** adapted to cooperate with the pawls **107** and **108**. Member **118** is also pivotally articulated to a depending hook member **122**. A spring **123** normally tends to impart upward movement to the member **122**, which through its pivotal articulation with the ball crank member **118** biases member **118** in a clockwise direction. The hook extremity of member **122** is adapted to engage the lower edge of the horizontal arm of a carriage return bell crank **124** mounted pivotally on a shaft **125** (Fig. 7).

Referring to Fig. 7, in response to a code combination of signals indicative of carriage return, the selection of the carriage return function bar **26** in the manner previously described, and the consequent operation of carriage return function lever **127** by the pawl **128** in a counterclockwise direction will be effected, whereupon interponent **129** is actuated rightwardly to impart clockwise movement to bell crank **124** against the pull of its spring **131**. Clockwise movement of lever **124** causes the horizontal arm thereof to depress the hook member **122** to, in turn, rotate the bell crank **118** counterclockwise to cause the lateral portion **121** thereof to disengage the pawls **107** and **108** from the ratchet wheel **106**. Simultaneously, the carriage return bell crank **124** will become latched up by the latch portion **132**. The ratchet wheel **106** and the arm **133** rotatable therewith are now free to be rotated counterclockwise by the carriage return spring in well known manner. This counterclockwise rotation will continue until the lever arm **133** strikes the unlatching arm **134** of the latch lever **130**, whereupon the lever **130** is rotated clockwise about its pivot **135** against the pull of spring **138** to disengage latch **132** from the bell crank **124**. Through the pull of spring **123** on hook member **122**, the bell crank **118** will be returned to its clockwise position to permit re-engagement of pawls **107** and **108** with the ratchet **106**. An arm **136** is also associated with the spacing mechanism, which is adapted to cooperate with a dashpot shock absorbing device **137**.

Facilities have been provided according to the present invention for accomplishing the carriage return and line feed functions simultaneously. For example, if an operator fails to send the carriage return and line feed function signals before the type carriage **114** is within substantially one character space of the right end of the line, the automatic carriage return arm **141** on the spacing drum **113** actuates the automatic return bell crank **142**.

As the spacing drum **113** and ratchet **106** rotate clockwise in a step-by-step manner from the position shown in Fig. 8, pursuant to character spacing, the arms **133**, **136**, and **141** move therealong. Then as the arm **141** approaches the laterally directed portion **143** of bell crank **142** it will at a predetermined time concurrent with the last (or any predetermined) character space in the printed line coact with the portion **143** to rotate the bell crank **142** clockwise about its pivot **144** against the action of a spring **145**. The vertical arm **146** of bell crank **142** is articulated to the automatic carriage return and line feed code bar **28** (Figs. 1 and 8). Located adjacent to the carriage return function bar **126** and the line feed function bars **21** are the automatic carriage return and line feed function bars **25** and **26**. These latter two function bars are identical and each have only one code projection **27** which are located opposite the automatic carriage return and line feed code bar **28** which normally blocks the bars **25** and **26**.

When the code bar **28** is shifted to the right by the coaction of arm **141** and bell crank **142**, the bars **25** and **26** are conditioned for selection. Then upon the ensuing operation of bail **34**, the bars **25** and **26** are simultaneously actuated by their respective springs **22** to effect the operation of their respective pawls **41**, and therethrough, their respective levers **48** are operated. Thus, the automatic carriage return and line feed operating levers **48** operate respectively the carriage return slide arm **129** (Fig. 7) and the line feed slide arm **54** (Fig. 1) to cause the carriage return and line feed functions to occur simultaneously.

It is to be understood that the above-described arrangement is merely illustrative of the application of the principles of the invention. Numerous other arrangements may be readily devised by those skilled in

the art which will embody principles of the invention and fall within the spirit and scope thereof.

What is claimed is:

1. In a telegraph printer, selector mechanism comprising a plurality of permutation bars arranged in superposed horizontal planes, a plurality of function bars slidably mounted for movement toward and away from said permutation bars, the leading edge of each function bar adapted to cooperate selectively with said permutation bars, a bail member constantly contacting said leading edges to hold said function bars away from said permutation bars against the action of individual springs which normally tend to urge respective function bars toward said permutation bars, a secondary member associated with each function bar and disposed thereabove, spring means individually associated with said secondary members to urge said secondary members in a direction toward said permutation bars, each secondary member provided with an engaging portion adapted to be interengageable with an engaging portion on its associated function bar, means for operating said bail member periodically to enable movement of said function bars toward said permutation bars by said individual springs, whereby one of said function bars is selected according to a permuted setting of said permutation bars to effect cooperative interengagement between the engaging portions of said selected function bar and its respective secondary member, whence upon the return movement of the selected function bar by said bail, said secondary member is actuated positively, a lateral projection on said secondary member, means controlled by said lateral projection to control the initiation of a function, periodically operated stripper means effective under certain conditions of operation to disengage said secondary member from said selected function bar, and an auxiliary stripper means operably associated with said periodically operated stripper means and effective independently thereof to disengage predetermined ones of said secondary members.

2. In a telegraph printer, selector mechanism comprising a plurality of permutation bars arranged in superposed horizontal planes, a plurality of function bars slidably mounted for movement toward and away from said permutation bars, a secondary member associated with each function bar and disposed thereabove, each secondary member provided with an engaging portion adapted to be interengageable with an engaging portion on its associated function bar, means to effect cooperative interengagement between said engaging portions, whereby said secondary member is actuated positively, periodically operated stripper means effective to disengage said secondary member from its associated function bar, and an auxiliary stripper means operably associated with said periodically operated stripper means and effective independently thereof to disengage predetermined ones of said secondary members.

3. In a telegraph printer, selector mechanism comprising a plurality of permutation bars arranged in superposed horizontal planes, a plurality of function bars slidably mounted for movement toward and away from said permutation bars, a secondary member associated with each function bar and disposed thereabove, each secondary member provided with an engaging portion adapted to be interengageable with an engaging portion on its associated function bar, means to effect cooperative interengagement between said engaging portions, whereby said secondary member is actuated positively, periodically operated stripper means effective to disengage said secondary member from its associated function bar, an auxiliary stripper means operably associated with said periodically operated stripper means and effective independently thereof to disengage predetermined ones of said secondary members, and means to shift said periodically operated stripper means to render said auxiliary stripper means alternately effective and ineffective.

4. In a telegraph printer, selector mechanism comprising a plurality of permutation bars arranged in superposed horizontal planes, a plurality of function bars slidably mounted for movement toward and away from said permutation bars, a secondary member associated with each function bar and disposed thereabove, each secondary member provided with an engaging portion adapted to be interengageable with an engaging portion on its associated function bar, means to effect cooperative interengagement between said engaging portions in accordance with the selective operation of said permutation bars, whereby said secondary member is actuated positively, periodically operated stripper means effective to disengage said secondary member from its associated function bar, an auxiliary stripper means operably associated with said periodically operated stripper means and effective independently thereof to disengage predetermined ones of said secondary members, cam actuated means for invariably operating cylically said auxiliary stripper means, and means to shift said periodically operated stripper means to render said auxiliary stripper means alternately effective and ineffective.

5. In a page printer including a type carriage and a platen carriage, carriage return means comprising a carriage return spring, line feed means, character spacing means for moving one carriage with respect to the other including a spacing ratchet and a pair of pawls alternatively operable on said ratchet to effect rotation thereof to wind up said spring, selector mechanism comprising a plurality of code bars arranged in superposed horizonal planes, signal responsive means for controlling the permutative positionment of said code bars, a plurality of function bars slidably mounted for movement toward and away from said code bars, said plurality of function bars including normally selective carriage return and line feed function bars, an additional code bar, a pair of special function bars also adapted to control said carriage return means and said line feed means, an instrumentality adjustably related to said ratchet and rotatable therewith, and means articulated to said additional code bar and operably related to said instrumentality, whereby said additional code bar is selectively positioned independenlty of said signal responsive means to establish a predetermined selective arrangement of said code bars to select said pair of special function bars simultaneously to thereby effectuate the operations of said carriage return means and said line feed means simultaneously.

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