Feb. 1, 1955 B. F. MADSEN 2,701,045

BACKSPACING MECHANISM

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FIG. 1

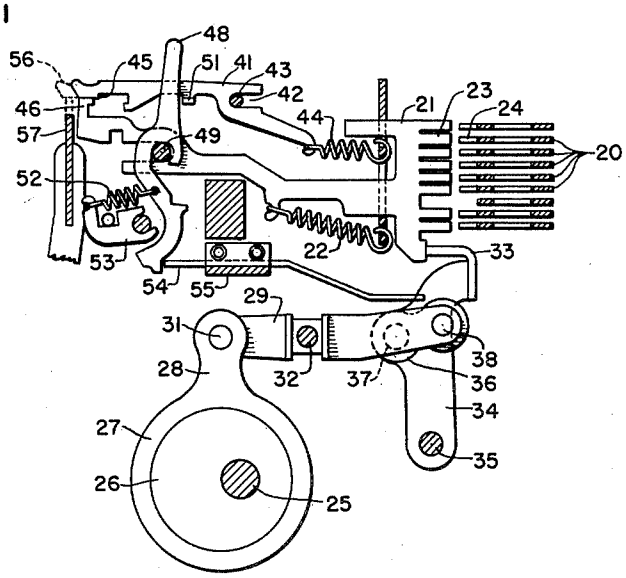


FIG. 2

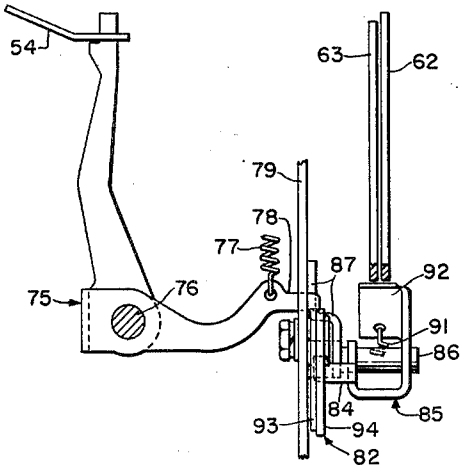
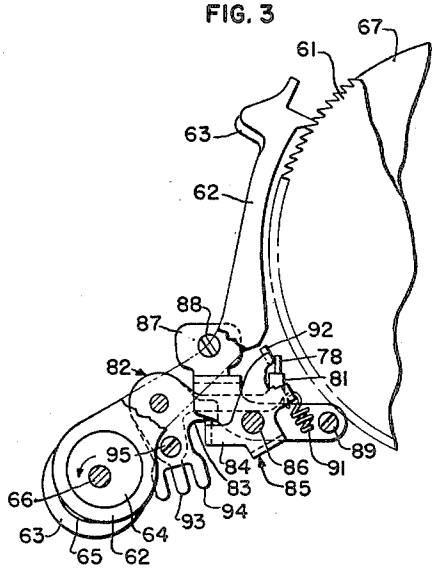


FIG. 3



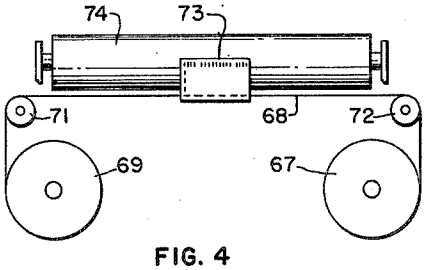


FIG. 4

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BACKSPACING MECHANISM

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FIG. 5

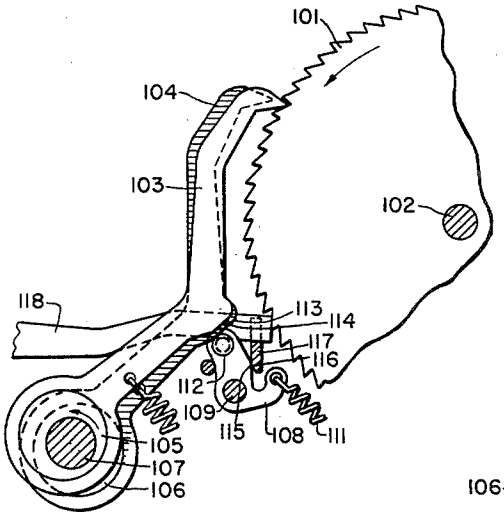


FIG. 6

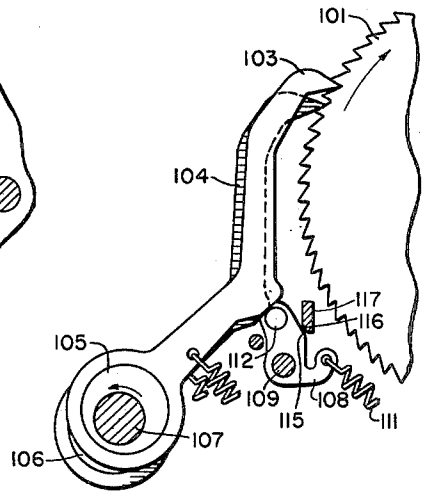
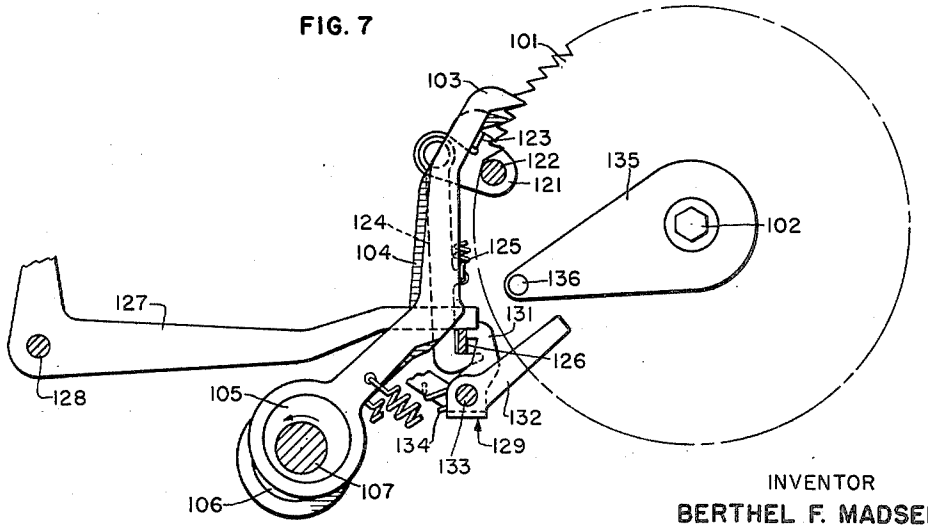


FIG. 7



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2,701,045

BACKSPACING MECHANISM

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Application November 8, 1951, Serial No. 255,347

9 Claims. (Cl. 197—91)

The present invention relates to printing telegraph apparatus and more particularly to character spacing mechanism therefor.

The primary object of the invention is to provide a telegraph printer having facilities responsive to code signals whereby the movable carriage of the printer apparatus is back spaced or moved in a direction reverse to the normal character spacing movement of the carriage.

The invention features in a telegraph printer having a movable carriage, a carriage spacing mechanism comprising means for driving said carriage, said driving means including a pair of drive members cooperable with said driving means, a pair of eccentric means individually associated with said drive members to actuate said drive members, said drive members effective alternatively upon said driving means in one manner to effectuate forward spacing movement to said carriage, and means for rendering said pair of drive members alternately engageable with said driving means in a different manner to effectuate back spacing movement to said 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, in which:

Fig. 1 is a side elevational view, partly in section, of the selective control unit substantially at the position of the back space function lever;

Fig. 2 is a fragmentary side elevational view of the back space mechanism;

Fig. 3 is a front elevational view of the back space mechanism according to the invention;

Fig. 4 is a schematic elevational view of a printer embodying the mechanism according to the present invention;

Fig. 5 is a front elevational view of a modified form of the invention in one condition of operation;

Fig. 6 is a front elevational view of said modified form of the invention in another condition of operation, and

Fig. 7 is a front elevational view of the carriage return mechanism according to the present invention.

Having reference to Fig. 1, there is shown the basic function mechanism with which the back spacing mechanism according to the present invention is 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.

A set of five code bars **20** is suitably mounted within the printer, which code bars are comparable to code bars 62 to 66 of said Patent No. 2,505,729. Each of said code bars **20** is movable longitudinally to one of two positions in accordance with the marking and spacing impulses of the well known Baudot code. 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 towards the code bars **20** by means of springs **22** individual to each function bar **21**. Each function bar **21** has a plurality of code projections **23** which cooperate with code notches **24** in each of the code bars **20**.

A continuously rotating power shaft **25** carries an eccentric cam **26**. A collar **27** is mounted rotatably on the eccentric **26** and has an arm **28** to which a lever **29** is secured pivotally at **31**. The lever **29** is mounted pivotally on a stationary shaft **32**. A bail **33** has a pair of arms **34** which are mounted pivotally on a stationary

shaft **35**. A pair of toggle links **36** are secured pivotally at **37** to the arms **34**, and are secured at the other ends thereof to pivots **38** to which the lever **29** is also secured. As the shaft **25** rotates, the lever **29** is oscillated about the shaft **32** to thereby, through the toggle links **36**, oscillate the bail **33**.

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 righthand 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** anchored on individual anchor members **53**. Associated with the lower end of the function operating lever **48** is an interponent member **54**, the purpose of which will be later described. 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 **33** 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 **33** 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 the function pawls **41** from latching engagement with their corresponding function bars **21**.

Having reference to Figs. 2 and 3, the character spacing mechanism of the present invention is exemplified by a spacing ratchet member **61** and a pair of driving pawl members **62** and **63**. The pawl members **62** and **63** are connected to eccentrics **64** and **65**, respectively, which are mounted on a cross shaft **66**. Power for operating the cross shaft **66** is derived from the main shaft (not shown) 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 member **61** is integral with and rotates the drum or pulley **67**, 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 **73**. To effect this movement in the present embodiment of the invention, the pawl members **62** and **63** are adapted to be alternately effective in a forward driving action to impart rotative motion to the ratchet member **61**.

In Fig. 4 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 **68** is adapted to be wound around a carriage return drum **69**, and extends around idler pulleys **71** and **72** to the spacing drum **67**. Fixed to the strap **68** is a movable type carriage **73** adapted to cooperate with a fixed platen **74**. With the arrangement according to the present invention forward spacing and back spacing are accomplished in a step-by-step manner, and normal carriage return is also contemplated. As is well known, the forward spacing movement (clockwise) imparted to drum **67** tends to wind

up the carriage return spring in the carriage return drum **69**. Then, when the pawls **62** and **63** are operated in a manner to be described to effect back spacing, the drum **67** is permitted to rotate counterclockwise due to the pull of the carriage return spring under the control of the pawls **62** and **63**.

Having reference to Fig. 2, the interponent **54** is pivotally articulated to a bell crank lever **75** which is mounted pivotally on a pivot shaft **76**. Normal counterclockwise rotation is imparted to lever **75** by a spring **77**.

The free extremity of the horizontal arm **78** of lever **75** extends through the front plate **79** of the printer and cooperates with an arm **81** of a composite lever **82**. Lever **82** is also provided with an arm **83** which cooperates with an arm **84** of a spacing pawl fulcrum member **85** mounted pivotally on a stud shaft **86** carried on a bracket **87** secured to the front plate **79** of the printer by screws **88** and **89**. Member **85** normally tends to rotate in a clockwise direction (as viewed in Fig. 3) by means of a spring **91**. Member **85** is also provided with a fulcrum portion **92** about which the pawl members **62** and **63** are adapted to pivot under certain operating conditions, as will hereinafter appear.

As previously mentioned, the lever **82** was referred to as a composite lever. This is for the reason that said lever **82** comprises two portions **93** and **94** which are relatively adjustable. For example, portion **94** is provided with a pair of spaced lugs, and the portion **93** is provided with a single lug adapted to be positioned between said pair of lugs. In this manner, the angular relationship between portions **93** and **94** may be readily adjusted by loosening the clamp screw **95** and inserting a screw driver or similar instrument between said lugs, on one side or the other of lug **93**, depending upon whether it is desired to make the angle between arms **81** and **83** greater or less.

In the normal operation of the forward spacing mechanism, the shaft **66** rotates 180° so that the pawls **62** and **63** are effective alternatively to move the type carriage one character space; that is, from the position shown in Fig. 3 the pawl **63** is in readiness to step the spacing ratchet wheel **61** one angular step in a clockwise direction commensurate with character spacing, while the pawl **62** is retracted one step. Then upon the next one-half rotation of the shaft **66**, the pawl **63** accomplishes the spacing movement, while the pawl **62** is slid back over the ratchet teeth in readiness for its next effective movement. It is observed that for forward character spacing, the pawls **62** and **63** are constantly engaging the periphery of the ratchet wheel **61** due to the pull of individual springs (not shown). That is, when the pawls **62** and **63** are drawn back to pick up the next tooth, the pawls merely ride over the ratchet teeth, and are not lifted therefrom.

As previously mentioned, during forward character spacing movement, the drum **67** is rotated clockwise to wind up the carriage return spring in the drum **69**. Therefore, to effect backward spacing movement, facilities are provided to permit the ratchet wheel **61** to escape step-by-step under the pull of the carriage return spring. These facilities comprise a signal controlled means for conditioning the fulcrum **92**, to render the fulcrum **92** effective to impart an escapement action to the pawls **62** and **63**.

In response to a code combination of signals indicative of back spacing, the code bars **20** will be set according thereto, to permit selection of function bar **21** and consequent operation of lever **48** in a counterclockwise direction, whereupon interponent **54** is actuated rightwardly (Figs. 1 and 2) to impart clockwise movement to bell crank lever **75** (Fig. 2). Clockwise movement of lever **75** causes the arm **78** thereof to depress the arm **81** of composite lever **82** thereby imparting clockwise movement (Fig. 3) to the lever **82**, to cause the arm **83** thereof to impart counterclockwise movement to the spacing pawl fulcrum member **85** against the action of spring **91**.

Carried on member **85** is the afore-mentioned fulcrum portion **92**, which during character spacing movement in a forward direction is spaced from said pawls **62** and **63** to permit said pawls **62** and **63** to ride constantly on the periphery of ratchet **61**. Thus, upon counterclockwise movement of member **85**, the fulcrum portion **92** will be moved into engagement with said pawls **62** and **63** without lifting the teeth of said pawls **62** and **63** out of engagement with the teeth of the ratchet wheel **61** in the normal stop position shown in Fig. 3. Then, upon rotation of the eccentrics **64** and **65**, the pawls **62** and **63**, instead of having only reciprocatory motion imparted to them, will now have both rotary and reciprocating motion imparted to them. In addition to the afore-described reciprocating motion of said pawls the rotary motion will be imparted about the fulcrum **92**. For example, from the normal stop position shown in Fig. 3, the pawl **62**, during one-half revolution of eccentric **64**, will be drawn back to permit ratchet **61** to follow in a counterclockwise or backward spacing direction under the pull of the carriage return spring. This is possible because substantially simultaneously therewith, the pawl **63** will be rotated about fulcrum **92** to lift the pawl tooth thereof out of engagement with the ratchet tooth. Then, upon the next one-half revolution of shaft **66** with its eccentrics **64** and **65**, the pawl **63** will be drawn back to allow ratchet **61** to follow it in a counterclockwise direction. At the same time, pawl **62** will be rotated about fulcrum **92** to lift the pawl tooth thereof from engagement from the ratchet wheel **61**. Thus, this action continues so long as back space signals are received, it being understood that a single back space operation occurs in response to each back space signal. With the arrangement according to the present invention, the printing of a character can proceed as described in said Patent No. 2,505,729, simultaneously just as readily during the back spacing operation as with the forward character spacing operation.

A modified form of the present invention is shown in Figs. 5 and 6. In this embodiment, the spacing ratchet **101** mounted on shaft **102**, cooperates with a pair of spacing pawls **103** and **104** carried on a pair of eccentric cams **105** and **106**, respectively, which in turn are fixed on a shaft **107**. Cooperating with the pawls **103** and **104** is a back space fulcrum member **108** mounted pivotally on a stud **109**. Member **108** is normally biased in a clockwise direction about stud **109** by a spring **111**. Fulcrum member **108** is provided with a fulcrum stud **112** adapted to cooperate selectively with appropriate bearing surfaces **113** and **114** on pawls **103** and **104**. Cooperating with a suitable cam surface **115** on the fulcrum member **108** is a coacting cam surface **116** on a laterally directed flange **117** of a back space control lever **118**.

Lever **118** is comparable to lever **75** shown in Fig. 2, and is normally positioned for forward character spacing as shown in Fig. 6, with the flange **117** ineffective to cam the fulcrum member **108** counterclockwise against the pull of spring **111**. In this condition reciprocative motion only is imparted to the pawls **103** and **104** to effect clockwise rotation to the ratchet wheel **101**. Upon receipt of a back space code signal, the lever **118** will be actuated clockwise in the manner described in connection with the preferred embodiment of the invention. As a result of this clockwise movement of lever **118**, the cam surface **116** coacts with cam surfaces **115** to impart counterclockwise movement to fulcrum member **108** to bring fulcrum **112** into contactual engagement with bearing surfaces **113** and **114** without lifting the teeth of pawls **103** and **104** from engagement with the periphery of ratchet wheel **101** when the eccentrics **105** and **106** assume the relationship shown in Fig. 6.

With the spacing mechanism conditioned for back spacing as shown in Fig. 5, the eccentrics **105** and **106** upon rotation will impart a combination of rocking motion about pivot or fulcrum **112** and vertically reciprocating motion to the rack members **103** and **104**. The relative movements of pawls **103** and **104** to effect back spacing are the same as described in connection with the preferred form of the invention shown in Figs. 2 and 3.

From the foregoing, it is observed that part of the carriage return mechanism is involved in the back spacing function; that is, the power for back spacing the type carrier step-by-step is derived from the carriage return spring under the control of the spacing pawls. Having reference to Fig. 7, the pawls **103** and **104** are operative alternatively to effect clockwise or counterclockwise rotation of ratchet wheel **101** as described in Figs. 5 and 6. Cooperating with the pawls **103** and **104** is a bell crank member **121** mounted pivotally on a stud **122**. Member **121** is provided with a laterally directed portion **123** adapted to cooperate with the pawls **103** and **104**.

Member 121 is also pivotally articulated to a depending hook member 124. A spring 125 normally tends to impart upward movement to the member 124, which through its pivotal articulation with bell crank member 121 biases member 121 normally in a clockwise direction.

The hook extremity of member 124 is adapted to engage the lower edge of an interponent member 126 which is pivotally mounted on the printer frame member. Cooperating with interponent 126 is the horizontal arm of a lever 127 mounted pivotally at 128. Lever 127 is comparable to lever 75 shown in Fig. 2. A latch member 129 cooperates with the interponent 126, and is adapted to hold said interponent 126 depressed during the carriage return operation. Latch member 129 is provided with a latch arm 131 and an unlatch arm 132, and is normally biased counterclockwise about pivot 133 by a spring 134. Integral with the ratchet wheel 101 is an arm 135 having a pin 136 extending laterally therefrom at the free end of said arm. Thus, through the pin 136, the arm 135 cooperates with the arm 132 of latch lever 129.

In the operation of the arrangement shown in Fig. 7, the ratchet wheel 101 is rotated clockwise for forward character spacing by the pawls 103 and 104 as previously described, with the pin 136 moving away from the arm 132. Then, when a carriage return signal is received the lever 127 is caused to be actuated clockwise to depress interponent 126, which through hook member 124 will rotate bell crank 121 counterclockwise to cause lateral portion 123 thereof to disengage the pawls 103 and 104 from the ratchet wheel 101. Simultaneously, the interponent 126 will become latched up by the latch portion 131 of latch lever 129. The ratchet wheel 101 and arm 135 are now free to be rotated counterclockwise by the carriage return spring in well known manner. This counterclockwise rotation will continue until the pin 136 strikes the unlatching arm 132 of latch lever 129, whereupon the lever 129 is rotated clockwise to disengage latch 131 from interponent 126. Through the pull of spring 125 on member 124, the bell crank 121 will be returned to its clockwise position to permit re-engagement of pawls 103 and 104 with the ratchet 101.

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 having a movable carriage, carriage spacing mechanism comprising an instrumentality for driving said carriage, a pair of drive members cooperable with said instrumentality, a pair of eccentric means individually associated with said drive members to actuate said drive members, said drive members alternatively effective upon said instrumentality in one manner to effectuate forward spacing movement to said carriage, and means for rendering said pair of drive members alternately engageable with said instrumentality in a different manner to effectuate backward spacing movement to said carriage.

2. In a telegraph printer having a movable carriage, carriage spacing mechanism comprising an instrumentality for driving said carriage, a pair of drive members cooperable with said instrumentality, a pair of eccentric means individually associated with said drive members to actuate said drive members, said drive members alternatively effective upon said instrumentality in one manner to effectuate forward spacing movement to said carriage, fulcrum means for rendering said pair of drive members alternately engageable with said instrumentality in a different manner to effectuate backward spacing movement to said carriage, and means for conditioning said fulcrum means to selectively effectuate said movements.

3. In a telegraph printer having a movable carriage, carriage spacing mechanism comprising an instrumentality for driving said carriage, a pair of drive members cooperable with said instrumentality, a pair of eccentric means individually associated with said drive members to actuate said drive members, said drive members alternatively effective upon said instrumentality in one manner to effectuate forward spacing movement to said carriage, means for rendering said pair of drive members alternately engageable with said instrumentality in a different manner to effectuate backward spacing movement to said carriage, and means for rendering said drive members ineffective to effectuate said movements.

4. In a telegraph printer having a movable carriage, carriage spacing mechanism comprising an instrumentality for driving said carriage, a pair of drive members cooperable with said instrumentality, a pair of eccentric means individually associated with said drive members to actuate said drive members, said drive members alternatively effective upon said instrumentality in one manner to effectuate forward spacing movement to said carriage, means for rendering said pair of drive members alternately engageable with said instrumentality in a different manner to effectuate backward spacing movement to said carriage, means for rendering said drive members ineffective to effectuate said movements, and means controlled by said instrumentality for restoring the effectiveness of said drive members.

5. In a telegraph printer having a movable carriage, carriage spacing mechanism comprising an instrumentality for driving said carriage, a pair of drive members cooperable with said instrumentality, a pair of eccentric means individually associated with said drive members to actuate said drive members, said drive members alternatively effective upon said instrumentality in one manner to effectuate forward spacing movement of said carriage, fulcrum means for said drive members, and means for conditioning said fulcrum means for rendering said pair of drive members alternately engageable with said instrumentality in a different manner to effectuate backward spacing movement to said carriage.

6. In a telegraph printer having a movable carriage, carriage spacing mechanism comprising an instrumentality for driving said carriage, a pair of drive members cooperable with said instrumentality, a pair of eccentric means individually associated with said drive members to actuate said drive members, said drive members alternatively effective upon said instrumentality in one manner to effectuate forward spacing movement to said carriage, fulcrum means for said drive members, means for conditioning said fulcrum means for rendering said pair of drive members alternately engageable with said instrumentality in a different manner to effectuate backward spacing movement to said carriage, and further means for rendering said drive members ineffective to effectuate said movements.

7. In a telegraph printer having a movable carriage, carriage spacing mechanism comprising an instrumentality for driving said carriage, a pair of drive members cooperable with said instrumentality, a pair of eccentric means individually associated with said drive members to actuate said drive members, said drive members actuated alternatively under certain conditions of operation in a reciprocatory manner to impart through said instrumentality a forward spacing movement to said carriage, and means effective under other conditions of operation to impart combined reciprocatory and rotary motion to said drive members to render said pair of drive members alternately engageable with said instrumentality to effectuate backward spacing movement to said carriage.

8. In a telegraph printer having a movable carriage, carriage spacing mechanism comprising a pair of drive members, a pair of eccentric means individually associated with said drive members to actuate said drive members, said drive members alternatively effective in one manner to effectuate forward spacing movement to said carriage, and means for rendering said pair of drive members alternatively effective in a different manner to effectuate backward spacing movement to said carriage.

9. In a telegraph printer having a movable carriage, carriage spacing mechanism comprising a pair of drive members, a pair of eccentric means individually associated with said drive members to actuate said drive members, said drive members alternatively effective in one manner to effectuate forward spacing movement to said carriage, control means for rendering said pair of drive members alternatively effective in a different manner to effectuate backward spacing movement to said carriage, and means for conditioning said control means to selectively effectuate said movements.

References Cited in the file of this patent

UNITED STATES PATENTS

1,469,778 Crawley ---------- Oct. 9, 1923