Sept. 14, 1943. J. W. LONG ET AL 2,329,278

PRINTING TELEGRAPH APPARATUS

Filed June 14, 1941 2 Sheets-Sheet 1

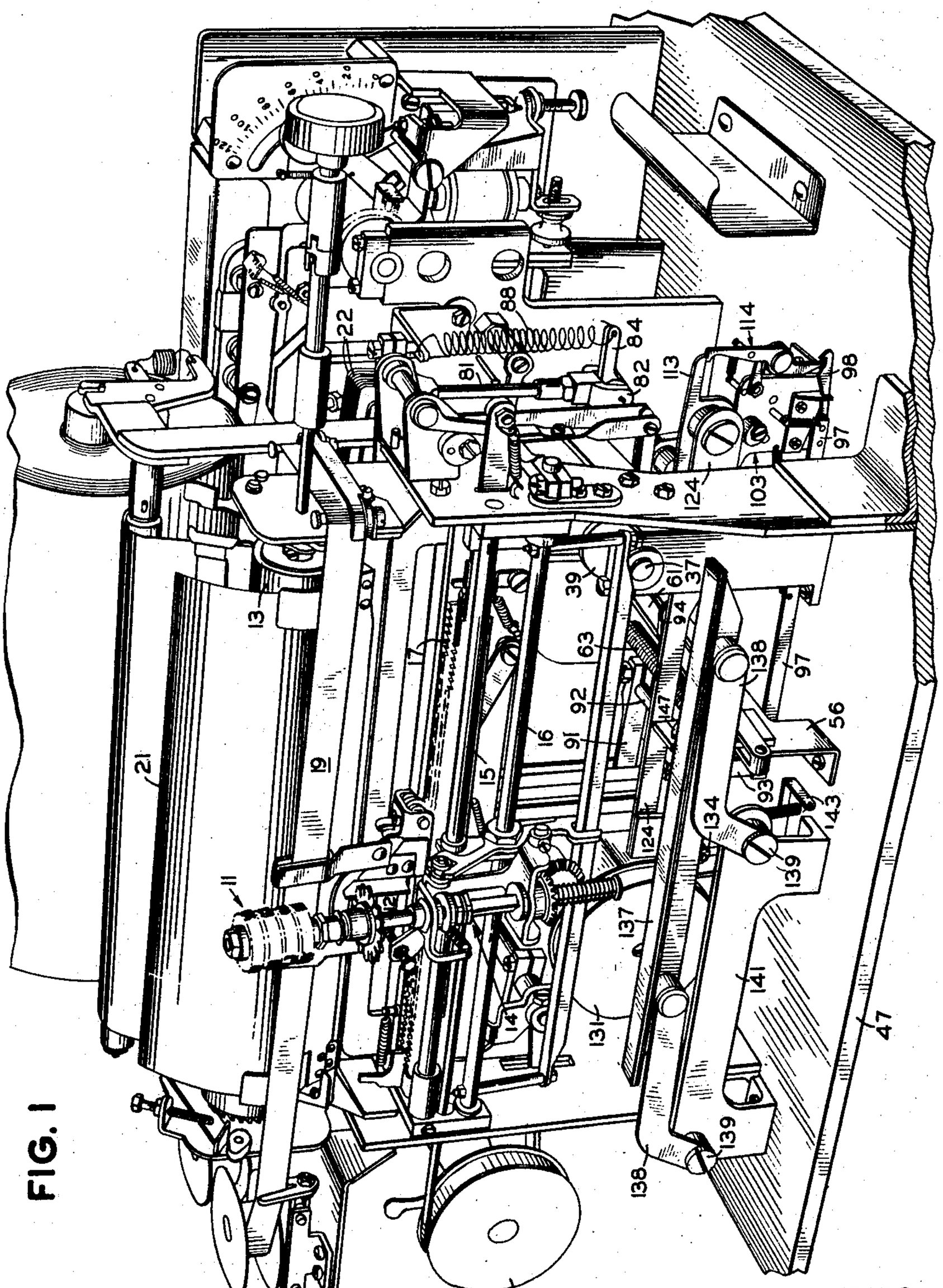

FIG. 1

INVENTORS
J. W. LONG
G. I. ROBERTS
BY W. R. Marsh
ATTORNEY

Sept. 14, 1943. J. W. LONG ET AL 2,329,278

PRINTING TELEGRAPH APPARATUS

Filed June 14, 1941 2 Sheets-Sheet 2

FIG. 4

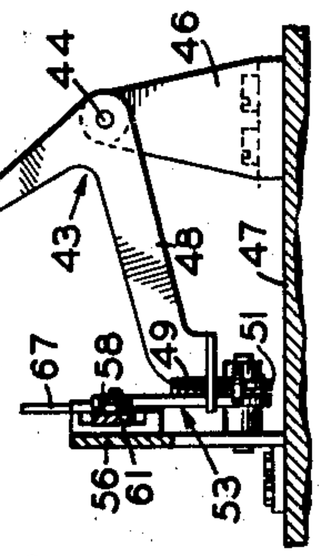

FIG. 5

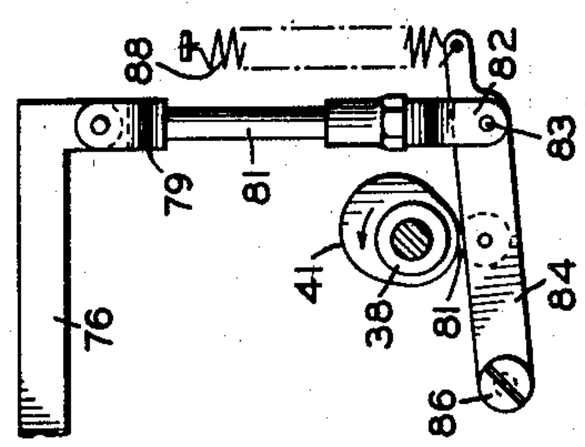

FIG. 2

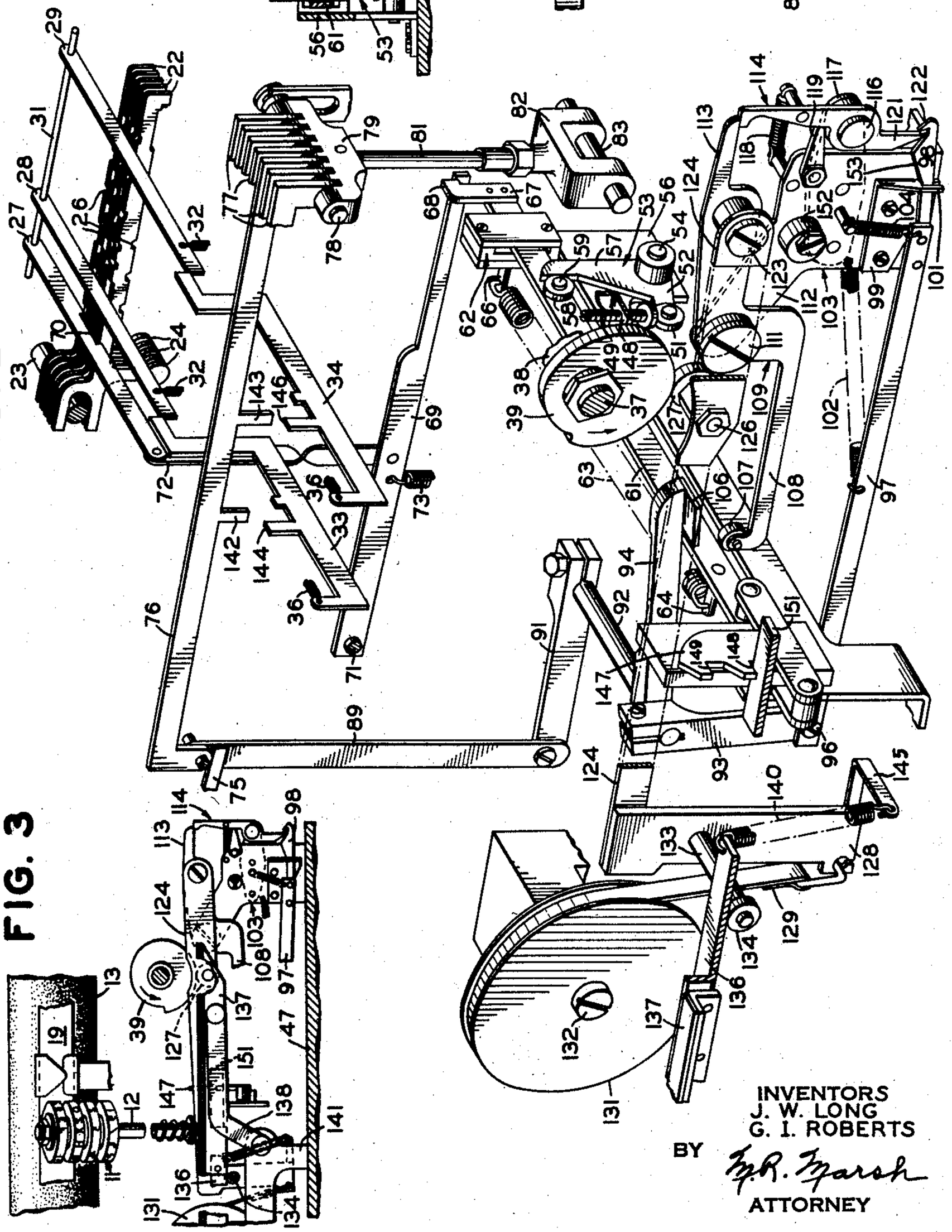

FIG. 3

INVENTORS
J. W. LONG
G. I. ROBERTS
BY E. R. Marsh
ATTORNEY

Patented Sept. 14, 1943 2,329,278

UNITED STATES PATENT OFFICE

2,329,278

PRINTING TELEGRAPH APPARATUS

James W. Long, Plainfield, and George I. Roberts, Maywood, N. J., assignors to The Western Union Telegraph Company, New York, N. Y., a corporation of New York

Application June 14, 1941, Serial No. 398,100

14 Claims. (Cl. 178—29)

This invention relates primarily to printing telegraph apparatus and more particularly to an improved and novel typewheel shifting arrangement for use primarily on and in conjunction with a telegraph printer such as that disclosed in a copending application of J. W. Long and G. I. Roberts, filed September 13, 1938, Serial No. 229,672, now Patent No. 2,281,775, granted May 5, 1942. Although the invention is shown in the drawings and hereinafter described as being employed on the above mentioned printer, it will be obvious that the principles thereof may be applied to various other printers.

The above mentioned application discloses a telegraph page printer employing a typewheel in the printing unit. The axis of the typewheel is disposed in a substantially vertical position and has four circumferential rows of type elements thereon. The typewheel moves back and forth relative to the recording paper to effect letter spacing and return thereof for a new line of print and, in addition, is moved axially to place any one of the four rows of type elements thereon in printing position. The present invention relates to the axial movement of the typewheel whereby any one of the plurality of circumferential rows is selectively positioned in a printing position opposite the recording platen.

In view of the above, it is one of the primary objects of the present invention to provide a typewheel elevating or axially shifting mechanism of improved design embodying fewer parts requiring less maintenance and adjustments, easier to manufacture, quieter in operation, and capable of high speed operation.

The typewheel of the above mentioned printer is axially shifted to bring any one of the four circumferential rows opposite the printing platen under the control of shift and unshift signals in conjunction with one of the impulses of each character code group. The shift and unshift signals determine from which of two circumferential rows on the typewheel following characters will be selected while the following character code groups select one of these two rows and a particular character thereon. To shift the typewheel from one of its extreme positions to the other requires a considerable amount of work and where such an operation is performed in a single movement a considerable load is imposed upon the operating mechanism and in connection with the above it is another object of the invention to provide means whereby the axial shifting of the typewheel from one extreme position to the other is effected in steps and not in a single operation.

The above and other objects of the invention will be more apparent when taken in conjunction with the following detailed description thereof and the accompanying drawings, in the latter of which:

Fig. 1 is a perspective view of the telegraph printer disclosed in the above mentioned Long et al. application with the present invention embodied thereon;

Fig. 2 is a perspective view showing the elements of the present invention and the manner in which they cooperate with certain of the elements of the above mentioned printer;

Fig. 3 is an elevational view showing principally the typewheel and the elevating mechanism therefor;

Fig. 4 is an elevational view showing a part of the control mechanism employed in controlling the elevation of the typewheel; and

Fig. 5 is a detailed view showing a part of the function operating mechanism of the printer.

The above mentioned printer is controlled by start-stop or simplex type of signals and as well known in the art, such signals comprise a start impulse of uniform line condition followed by a definite number, usually five, of character or code impulses in various permutations which are in turn followed by a rest impulse. When five code impulses of either one line condition or another are employed, thirty-two possible combinations are available and in order to increase the number of available characters that may be recorded, case grouping of the signals is resorted to. The case determining signals, sometimes called shift and unshift signals, condition the printer so that depending upon which of the shift signals has been transmitted, either one or the other of two different characters will be recorded in response to the same character group. In this way the number of available characters may be increased or almost doubled.

Referring to Fig. 1 the printing unit comprises a typewheel 11 having four circumferential rows of type elements thereon. The typewheel is secured to a typewheel shaft 12 for rotation therewith, which shaft is selectively rotated to bring selected ones of the characters on the typewheel opposite a printing platen 13. The typewheel is also axially moved to bring any one of the four peripheral rows opposite the platen 13.

The typewheel shaft 12 is carried in a carriage indicated in general by reference numeral 14 adapted to slide to and fro in front of the print-

ing platen 13 as guided on rods 15 and 16. The movement of the carriage 14 to the right in a letter spacing direction is effected by racks 17 engaging pawls (not shown) on the carriage. The disengagement of the pawls with the racks 17 allows a spring drum 18 to return the carriage for the beginning of a new line of print. Printing from the typewheel 11 after it has been selectively positioned both axially and rotatively is effected by rocking the same so as to force an inking ribbon 19 against the recording paper or blank 21. A complete description of the typewheel and its associated elements is given in the above mentioned copending application and reference may be had thereto for a complete and detailed description of the whole printer.

On the receipt of a code group of impulses, a set of selectors (not shown) equal in number to the number of intelligence impulses in a code group, are selectively positioned into one or the other of two positions and thereafter the setting of the selectors is transferred to a set of transfer bars 22, Fig. 2. The transfer bars 22 are guided for movement in the direction of their length on a stud 23 and other guiding means not shown, and assume either one or the other of two positions in accordance with the setting transferred thereto from the selectors. The transfer bars 22 through depending arms 24 control a stop unit device (not shown) which determines the rotative position of the typewheel. In addition to the above the transfer bars 22 by means of notches such as 26 arranged on both the upper and lower sides thereof control various of the printer functions such as shift and unshift, line feed and carriage return. Associated with the transfer bars 22 in operative relation with the notches 26 are a series of pivot levers such as 27, 28 and 29 which cooperate with the notches in such a manner that for predetermined settings of the transfer bars 22 the pivot levers are permitted to enter a row of aligned notches or to be selectively operated. The pivot levers 27, 28 and 29 are pivotally mounted at their rear ends on a pivot rod 31 and the levers 28 and 29 have springs such as 32 which tend to force the same into the notches.

Associated with the left hand end of the pivot levers 28 and 29 are individual slide bars 33 and 34. Springs such as 36 tend to slide the slide bars 33 and 34 toward the right and hold the right hand ends thereof in abutting engagement with the left hand ends of associated pivot levers. The slide bars 33 and 34 are suitably guided for longitudinal movement in guides not shown. When one of the pivot levers 28 or 29 is allowed to enter a row of aligned notches in the transfer bars 22, the left hand end is moved downward and out of blocking engagement with the right hand end of the associated slide bar whereupon the slide bar is free to move a predetermined distance to the right under the action of its attached spring 36. The movement of the slide bar from its normal left hand position to a selected right hand position determines whether or not certain of the printer functions will be performed on or during associated cycles of operation. The manner in which the slide bars 33 and 34 control the performance of certain of the printer functions will be described in the following paragraph.

Located in the printer is a constantly rotating shaft 37 and arranged to be clutched to the shaft for one revolution at a time in conjunction with the receipt of each code group of impulses is a sleeve 38. Located on the sleeve 38 and adapted to rotate therewith are a series of cams among which are included an elevating cam 39, a sliding bar operating cam 40, Fig. 4, and a floating lever operating cam 41, Fig. 5. In operative relation with the periphery of the sliding bar operating cam 40, Fig. 4, is a cam follower 42, located on the upper end of an upwardly extending arm of a bell crank 43. The bell crank 43 is pivotally mounted on a pin 44 supported in a bracket 46 attached to the base plate 47 of the printer. The leftwardly extending arm 48 of the bell crank 43 carries therein an inverted screw 49, the head of which is in operative relation with a roller 51 carried in the rightwardly extending arm 52 of a bell crank 53, Fig. 2. The bell crank 53 is pivotally mounted on a pivot pin 54 extending horizontally from a bracket member 56 and has an upwardly extending arm 57 positioned in the rear of a roller 58 located on a pin 59 in a sliding bar 61.

The sliding bar 61 is guided for longitudinal movement in blocks such as 62 located adjacent either end which are supported in the upper part of the bracket member 56. A spring 63 is attached to the sliding bar 61 by means of a pin 64 and has the other end anchored on a pin 66 extending from the bracket 56. The spring 63 tends to slide the sliding bar 61 toward the rear of the printer but is only permitted to do so at predetermined times.

The sliding bar operating cam 40 is shown in its normal rest position in Fig. 4 and shortly after the sleeve 38 starts to rotate, the follower 42 is allowed to enter the notch in the cam whereupon if the sliding bar 61 is not blocked by other means, the spring 63 is allowed to move the same an amount limited by the depth of the notch in the cam 40 toward the rear of the printer. The bell cranks 43 and 53 thus control the movement of the sliding bar at the beginning of its movement and near the end of a revolution of the cam 40 it operates the bell cranks 53 and 43 and the above described elements to cause the sliding bar 61 to move forward back into its normal position.

Secured to the rear end of the sliding bar 61 is an upwardly projecting member 67 which has a rightwardly extending finger 68. The finger 68 cooperates with the right hand end of a lever 69 pivoted at its left hand end on a pivot pin 71. A link 72 is pivotally attached to the center of the lever 69 and to the forward end of the pivot lever 27 so that the pivot lever 27 and lever 69 move together. A spring 73 attached to the lever 69 tends to pivot the same in a downward direction and holds the pivot lever 27 in engagement with the transfer bars 22. It will be noted that the pivot lever 27 has a recessed portion or notch 70 therein extending over the first four of the transfer bars 22 and accordingly its pivoting is controlled solely by the rearmost one of the transfer bars. Thus with the rearmost transfer bar 22 in one position, the pivot lever 27 is held in its elevated position whereas with the same transfer bar in its opposite position, the pivot lever 27 enters the notch in the bar and pivots in a downward direction. Thus only the rearmost one of the transfer bars 22 controls the pivoting of the pivot lever 27.

When the pivot lever 27 is held in its upper position, the link 72 attached thereto pivots the lever 69 to place the free end thereof in the path of the finger 68 on the member 67 at the right hand end of the sliding bar 61. There is little

clearance between the finger 68 and the end of the lever 69 and therefore with the lever in the path of the finger 68, the spring 63 attached to the sliding bar is capable of moving the same as controlled by the cam 40 only a slight distance before it is blocked by the lever 69. However, when the pivot lever 27 enters the notch in the rearmost transfer bar 22, the lever 69 is pivoted downward to remove the end from the path of movement of the finger 68 and hence with the lever 69 in this position, the movement of the sliding bar 61 is not blocked and it is therefore allowed to slide to the rear an amount determined by the depth of the notch in the cam 40. Thus, depending upon the position of the rearmost transfer bar 22, the sliding bar 61 is allowed to move to the rear only a small amount or an appreciable amount. The two positions of the sliding bar 61 determines in a manner hereinafter described whether printing will be effected from one or the other of two circumferential rows of type elements on the typewheel 11, Figs. 1 and 3.

The functions of the printer are controlled by a set of socalled floating levers, one of which, the shift control floating member 76, is shown in full in Fig. 2, whereas only a fragmentary part of the right hand ends of the other floating levers 77 are shown. The right hand ends of the floating levers 76 and 77 are pivotally carried on a pivot pin 78 secured in the upper end of a yoke member 79. Secured to the yoke 79 is an operating rod 81 which has attached to its lower end a U-shaped member 82. The U-shaped member 82 carries a pivot pin 83 by means of which the member 82 is pivotally connected to the right hand end of a lever 84, Fig. 5. The lever 84 is pivotally supported on a screw 86 at its left hand end and carries adjacent the center a cam follower 87. The cam follower 87 is in operative relation with the cam 41 on the sleeve 38 and is held in engagement therewith by a spring 88 attached to the lever 84.

The cam 41 is shown in its normal rest position in Fig. 5 and during each revolution of the cam sleeve 38 the cam 41 causes the lever 84 to pivot in a clockwise direction after which the spring 88 pivots it back to its normal position in a counter-clockwise direction. The operation of the lever 84 is timed with respect to the operation of the sliding bar 61 as controlled by the sliding bar operating cam 40 so as to occur later in the cycle.

The shift control floating lever 76 is the only one that enters into the control of the mechanism including the present invention and in order to simplify the drawings only this floating member is shown in full. The left hand end of the floating lever 76 rests on a stop 75 and has pivotally attached thereto and depending therefrom a link 89, the lower end of which is pivotally attached to the free end of a clamping arm 91 clamped to the rear end of a pivot rod 92. The pivot rod 92 is suitably supported in brackets (not shown) and has clamped thereto for pivoting movement therewith adjacent the forward end a depending arm 93 and a rightwardly extending arm 94.

Attached to the lower end of the arm 93 by means of a shoulder screw 96 is a rightwardly extending lever 97. Secured to the right hand end of the lever 97 is a hooked member 98. A bracket 99 with a vertical slot 101 therein guides the hooked member 98. A spring 102 attached to the lever 97 and anchored in a bracket 103 tends to move the lever 97 toward the right and pivot the rod 92 in a counter-clockwise direction as limited by the engagement of the floating lever 76 with the stop 75. A second spring 104 attached to the lever 97 and also anchored in the bracket 103 tends to elevate the right hand end of the lever 97 and hooked member 98 to hold the latter against the bottom of the slot 101 in the bracket 99.

The rightwardly extending arm 94 attached to the rod 92 has on the right hand end thereof a shoe 106. The shoe 106 is located above and in vertical alignment with a roller 107 pivotally carried on the end of a leftwardly extending arm 108 of a lever 109. The lever 109 is pivotally mounted adjacent its center on a shoulder screw 111 carried in the end of the leftwardly and upwardly extending arm 112 of the bracket 103. The end of the right hand arm 113 of the lever 109 extends over the upper end of a latch lever 114. The latch 114 is pivotally mounted on a shoulder screw 116 carried in a bracket 117 secured to the bracket 103. A spring 118 attached to the latch 114 normally tends to pivot the same in a counterclockwise direction and normally holds the latch 114 against an adjustable limiting stop 119. The latch 114 is disposed in a substantially vertical position and the depending arm 121 thereof is in operative relation with the hooked portion 122 on the hooked member 98.

Located on the arm 113 of the lever 109 is a shoulder screw 123 upon which is pivoted at its right hand end an elevator lever 124. Adjacent the center of the elevator lever 124 is a stud 126 which carries a roller cam follower 127 in operative alignment with the elevator cam 39. The left hand end of the elevator lever has a depending member 128 attached thereto. Attached to the member 128 is a flexible ribbon 129 adapted to wind about a spring drum 131. The spring drum 131 is pivotally mounted on a shoulder screw 132 and, by virtue of the spring contained therein, tends to rotate the drum 131 in a counterclockwise direction to wind the ribbon 129 thereabout and thus elevate the elevator lever 124. The spring drum 131 tending to elevate the lever 124 holds the cam follower 127 in engagement with the periphery of the elevator cam 39 and, if the lever 124 is not prevented from pivoting by means hereinafter described, the same is allowed to rise as controlled by the cam 39. Some time later in the cycle of the cam 39 the high part thereof engages the follower 127 to depress the lever 124 and move the same back into its normal position. Thus, during each operating cycle of the printer, the elevator lever tends to rise an amount limited by the depth of the notch in the cam 39, after which it is depressed back into its normal position. The above operation of the elevator lever 124 occurs in timed relation to the operations of the other mechanisms.

Extending horizontally from adjacent the center of the member 128 at the left hand end of the elevator lever 124 is a stud 133 which carries on its forward end a roller 134. The roller 134 is positioned beneath a bracket member 136 attached to the back of an elevator bar 137, Figs. 1 and 3. The elevator bar 137 is disposed in a horizontal position and pivotally attached thereto are two similar arms 138. The other ends of the arms 138 are pivotally supported on shoulder screws 139 in a bracket 141 secured to the base 47. Thus, as the elevator bar 137 moves in a manner hereinafter set forth, it at all times remains horizontal. A spring 140, Fig. 2, is attached to the bracket member 136 and to an

arm 145 of the member 128 to hold the bracket member 136 in engagement with the roller 134.

When the elevator lever 124 is elevated to any one of a plurality of positions in a manner hereinafter described, the roller 134 moving upwardly therewith engages the bracket member 136 to elevate the elevator bar 137. Similarly, as the elevator lever 124 is depressed back into its normal position from any one of its elevated positions, the spring 142 returns the elevator bar 137 back to its normal position.

The lower end of the typewheel shaft 12 is positioned a slight distance above the upper surface of the elevator bar 137 and elevation of the said bar engages the typewheel shaft to elevate the same therewith. The typewheel shaft 12 is carried on the carriage 14 in such a manner that it is capable of being moved axially while at the same time maintaining the correct angular relation with the stop unit (not shown). After the typewheel shaft is elevated in accordance with the amount of movement of the elevator bar 137, it is latched in its elevated position by latching means (not shown) and some time thereafter rocked to effect the printing operation. Some time after the printing operation in timed relation to the various other operations, the typewheel shaft is unlatched and permitted to drop to the extent limited by the elevator bar 137. Thus, the elevator bar 137 is effective to elevate the typewheel shaft 12 and the typewheel 11 to place any one of the four rows of type elements thereon in printing position. The manner in which the elevator bar 137 is controlled to elevate the typewheel into any one of its plurality of positions will be set forth in following paragraphs.

Located adjacent the center of the shift control floating lever 76 are two depending fingers 142 and 143, with the finger 143 being slightly longer than the finger 142. The fingers 142 and 143 are located directly above associated slide bars 33 and 34, respectively. The slide bar 33 has an upwardly extending finger 144 and the slide bar 34 an upwardly extending finger 146. With the slide bars 33 and 34 in their normal position, as held by the ends of associated pivot members 28 and 29, respectively, the fingers 144 and 146 are out of alignment with associated fingers 142 and 143 on the floating lever 76. The movement of the slide bar 34 from its normal forward position to its selected position by the selective operation of an associated pivot lever 29 places the finger 146 beneath the associated finger 143. Similarly, the movement of the slide bar 33 to a selected position places the finger 144 beneath the associated finger 142 on the floating lever 76.

As hereinbefore described, the right hand ends of the floating levers 76 and 77 move in a downward direction during each cycle of operation of the printer and normally pivot idly about their left hand ends. The floating levers control the functions of the printer, and when a particular function is to be performed, a slide bar is selected so that a finger thereon is in operative alignment with a finger or fingers on certain ones of the floating levers. With a finger on a slide bar in operative alignment with one of the floating levers, the associated floating lever pivots about the finger adjacent the center thereof and not idly about the left hand end. The present invention is concerned primarily about the shift and unshift functions of the printer, and accordingly only these functions will be described in detail, the other functions being selectively performed in much the same manner.

With the elevator lever 124 in the position as shown in Fig. 2, the printer is conditioned in its so-called "unshift" position and in such a position is capable of printing letters. In this position the free end of the arm 113 of the lever 109 rests upon the upper end of the latch 114. With the printer in its unshift position, the conditioning thereof to its shift position is controlled by the slide bar 33. The selection of the slide bar 33 places the finger 144 thereon beneath the finger 142 on the shift control floating lever 76, and when the right hand ends of the floating levers are subsequently moved in a downward direction, the finger 142 engages the finger 144. An appreciable amount of movement in the right hand ends of the floating lever 76 is required before the finger 142 thereon engages the finger 144, and up to this time the floating lever pivots idly about its left hand end. When the finger 142 engages the finger 144, the end of the finger 142 serves as a pivot point to cause the elevation of the left hand end of the floating lever 76 and its attached link 89. This upward movement of the link 89 conditions the printer to print figures in a manner hereinafter pointed out.

In a similar manner the selection of the slide bar 34 places the finger 146 beneath the finger 143 on the floating lever 76 to cause the floating lever to pivot about the end of the finger 143 and thereby elevate the left hand end. The finger 143 is somewhat longer than the finger 142, and with the fingers 144 and 146 of substantially equal length the finger 143 will engage the finger 146 with less movement of the right hand end of the floating lever 76 than the movement required to engage the finger 142 with the finger 144. Consequently, the selection of the slide bar 34 causes greater elevation of the left hand end of the floating lever 76 and attached link 89 than the selection of the slide bar 33. The fact that the slide bar 34 is nearer the right hand end of the floating lever 76 which moves a predetermined amount during each cycle than the slide bar 33 also is effective to cause greater elevation of the left hand end of the shift control floating lever 76 on the selection of the slide bar 34. Thus, depending upon the selection of either the so-called "figures" slide bar 33 or the "letters" slide bar 34, the link 89 is elevated either a first or a second amount. The manner in which the elevation of the link 89 these two amounts controls the printer to record either letters or figures will be described hereinafter.

Attached to the forward end of the sliding bar 61 is an upwardly projecting notched member 147 with two notches 148 and 149 therein. The notches 148 and 149 cooperate with a bracket member 151 attached to the back of the elevator bar 137. With the printer in its letters position and with the sliding bar 61 in its forward position, the notch 148 is positioned a slight amount above the horizontal surface of the bracket 151, and accordingly, as the cam 39 rotates to allow the elevator lever 124 to rise, the amount of movement thereof is determined by the clearance between the notch 148 and the bracket 151. The amount of rising of the elevator lever 124 of this condition is relatively small and is not sufficient to engage the elevator bar 137 with the bottom of the typewheel shaft 12. Consequently, the typewheel 11 will remain in its lowermost position with the upper row of type elements thereon in printing relation with the platen 13.

When it is desired to select a character from the second row of type elements from the top of the typewheel, one of the selecting impulses of each of such code groups is of such a character that the associated or rearmost one of the transfer bars 22 is positioned to permit the pivot lever 27 to assume its lower position. As hereinbefore described, with the pivot lever 27 in this position the end of the lever 69 is moved out of blocking relation with the finger 68 of the sliding bar 61 and, consequently, when the sliding bar subsequently slides to the rear, it is not blocked and is allowed to slide to the rear an amount determined by the depth of the notch in the sliding bar operating cam 40. When the sliding bar 61 is moved to its rearmost position, the notches 148 and 149 in the member 147 are out of operative relation with the horizontal position of the bracket 151 and, therefore, do not interfere with the elevation of the elevator bar 137. Thus, when the notch in the cam 39 engages the roller 127 on the elevator bar 124, the spring drum 131 is permitted to elevate the lever 124 and the elevator bar 137 the full amount determined by the depth of the notch in the cam 39. The various links and levers are so proportioned that this amount of elevation of the elevator lever 124 places the second peripheral row of type elements from the top on the typewheel 11 in printing relation to the platen 13, the typewheel being latched in its elevated position to permit the return of the elevating mechanism to its normal position prior to the printing operation. Thus, with the printer in its unshift or letters position, the character of a predetermined one of the intelligence impulses determines whether or not printing will be effective from either the first or second peripheral rows of elements from the top on the typewheel 11.

With the printer in its unshift or letters position as shown in Fig. 2, the selection of the figures slide bar 33 conditions the printer to its shift position. As hereinbefore described, the selection of the slide bar 33 causes a first predetermined amount of pivoting of the shift control floating lever 76 or the elevation of the left hand end and the attached link 89 a first predetermined amount. The elevation of the link 89 through the arm 91 causes the rod 92 to pivot in a clockwise direction. The arm 93 pivoting with the rod 92 causes the lever 97 and hooked member 98 to move toward the left. The movement of the hooked member 98 to the left causes the hook 122 thereon to engage the lower end of the arm 121 of the latch 114 to pivot the same in a clockwise direction against the action of its attached spring 118. This pivoting of the latch 114 withdraws the upper end thereof out from beneath the end of the arm 113 of the lever 109, whereupon the lever 109 is free to pivot in a clockwise direction about the shoulder screw 111. An adjustable eccentric stop 152 on the bracket 103 determines the amount of pivoting of the lever 109 in a clockwise direction while the force for pivoting the lever 109 is derived from the spring drum 131 tending to pivot the elevator lever 124 in a clockwise direction with the roller 127 thereon engaging the cam 39 serving as a pivot. Thus, when the lever 109 pivots from the position shown in Fig. 2, wherein the end of the arm 113 rests on the upper end of the latch 114, into engagement with the adjustable stop 152, the elevator lever 124 is permitted to pivot a predetermined amount in a clockwise direction.

This pivoting of the elevator lever 124 causes the elevator bar 137 to rise an amount substantially equal to that of two consecutive rows of type on the typewheel 11, and accordingly when the elevator lever 124 is thus pivoted, the typewheel shaft 12 is elevated an amount sufficient to place the third row of type elements from the top in printing relation with the platen 13. The member 147 does not interfere with the elevation of the elevator bar 137 on the above pivoting of the elevator lever 124 as a shift combination is such that upon the selection of the shift slide bar 33 the sliding bar 61 will be in its rearmost position where the notch 148 is out of operative relation with the horizontal portion of the bracket 151.

During the movement of the member 98 to the left, as above described, a sloping surface 153 thereon engaging the bottom of the bifurcation 101 cams the hooked member 98 downward to disengage the hooked portion 122 thereon from the lower end of the arm 121 shortly after the upper end of the latch 114 has moved out from beneath the free end of the arm 113. On the disengagement of the hook 122 from the lower end of the arm 121, the latch 114 is pivoted back into its normal position against the member 119 by the spring 118. The movement of the hooked member 98 to the left during a shift cycle of operation stops soon after the hook 122 is disengaged from the arm 121 after which the return of the floating levers to their normal position effects the return of the hooked member 98 to its normal position in operating relation with the latch 114.

The nature of the shift code combination is such that during the receipt thereof the sliding bar 61 is moved to the rear and, accordingly, as the cam 39 revolves in the associated cycle, the elevator bar 124 is permitted to pivot an amount sufficient to place the lowermost row of type elements in printing relation with the platen 13. However, printing is blocked during a shift function and, as the cam 39 rotates to its normal position, the elevator lever 124 is pivoted in a counterclockwise direction to permit the elevator bar 137 to be lowered an amount sufficient to place the third row of type elements from the top in the printing plane. Thus, following the shift code group, the third row of type elements from the top is placed in printing relation with the printing platen. With the printer in its shift position, the character of one of the impulses of each succeeding group controls the sliding bar 61 to determine whether or not the elevator lever 124 pivots only a slight amount or the amount permitted by the depth of the natch in the cam 39. With the sliding bar 61 in its forward position, the notch 149 engages the bracket 151 to prevent any appreciable pivoting of the elevator lever 124 whereas with the sliding bar 61 in its rearmost position the lever 124 is permitted to pivot to the full amount of the notch in the cam 39. Thus, on the receipt of a shift or figures code group, the pivot point or shoulder screw 123 of the elevator lever 124 is shifted from its upper normal position to its lower position as determined by the adjustment of the stop 152, and this changing of the elevator lever pivot point places the third row from the top of the type elements in the printing plane.

The printer is returned to its unshift position from the shift position by the selection of the letters shift slide bar 34 which, as above described, causes the pivoting of the shift control floating lever 76 and the elevation of the link 89 a second predetermined amount, which second predeter-

mined amount is considerably greater than that effected during the shift cycle of operation. During the clockwise pivoting of the lever 109 in the above described shift cycle of operation, the roller 107 on the left hand end of the arm 108 is elevated and brought closer to the shoe 106 at the right hand end of the arm 94 on the rod 92. Accordingly, when the link 89 is elevated the second predetermined amount in response to the unshift signal, the rod 92 is rotated clockwise to cause the shoe 106 on the arm 94 to engage the roller 107 and pivot the lever 109 in a counterclockwise direction. This pivoting of the lever 109 is sufficient to elevate the free end of the arm 113 above the upper end of the latch 114 and, as the rod 92 returns to its normal position, the arm 113 is permitted to rest on the top of the latch. Although the latch 114 is operated in the same cycle of operation, it will have returned to its normal position in time to engage the end of the arm 113. This pivoting of the lever 109 in a counterclockwise direction elevates the shoulder screw 123 at the right hand end of the elevator bar 124, and during such movement the roller 127 on the lever 124 serving as a pivot causes said lever to pivot in a counterclockwise direction to effect lowering of the typewheel an amount sufficient to place the uppermost row of type elements in the printing plane. Thus, the printer is positioned in its unshift position and the movement from one shift position to the other consists primarily of shifting the location of the normal pivot point or shoulder screw 123 of the elevator lever 124. This shifting of the location of the pivot point of the lever 124 is determined by the amount of pivoting of a common shift control floating lever 76, one amount of pivoting of the lever 76 being effective to shift the location of the pivot point of the elevator lever 124 from a first to a second position, while the second amount of pivoting of the lever 76 shifts the location of the pivot point of the lever 124 from the second to its first position. The various operations of the printer occur in timed relation with respect to one another and effect their associated functions without interference, the timing thereof being fully described in the above mentioned copending application.

It is obvious, of course, that various modifications of the invention other than the embodiment shown in the drawings and described herein may be made without departing from the spirit or essential attributes thereof, and it is desired, therefore, that only such limitations be placed thereon as are disclosed by the prior art or are specifically set forth in the appended claims.

What is claimed is:

1. In a telegraph receiver, an axially movable typewheel with a plurality of circumferential rows of type elements thereon, said typewheel normally having either a first or a second predetermined row of type elements in a printing plane, a cyclically operable function control lever normally pivotable about a predetermined point, a selector means, means controlled by said selector means for selecting other pivot points for said function control lever, means controlled by said function control lever in pivoting about a first selected pivot point for placing the first predetermined row of said type elements in the printing plane, and means controlled by said function control lever in pivoting about a second selected pivot point for placing a second predetermined row of type elements in the printing plane.

2. In a telegraph receiver selectively controlled in response to received code groups of impulses, an axially movable typewheel having a plurality of more than two circumferential rows of type elements thereon, said typewheel being axially movable to place the rows of type elements thereon in a printing plane, a cyclically operable function control lever normally pivotable about a predetermined point, a selector means, means controlled by said selector means in response to a first code group of impulses for selecting a first selected pivot point for said function control lever whereby the same operates to cause the axial movement of said typewheel to place a first predetermined row of said type elements in the printing plane, means controlled by said selector mechanism in response to a second code group of impulses for selecting a second selected pivot point for said function control lever whereby the same operates to cause the axial movement of said typewheel to place a second predetermined row of type elements in the printing plane, and means controlled by said selector mechanism by a part of following code groups of impulses with the first of said predetermined rows of type elements in the printing plane for placing a third predetermined row of type elements in the printing plane.

3. In a telegraph receiver selectively controlled in response to received code groups of impulses, an axially movable typewheel having a plurality of more than two circumferential rows of type elements thereon, said typewheel being axially movable to place said rows of elements one at a time in a printing plane, a cyclically operable function control lever normally pivotable about a predetermined point, a selector means, means controlled by said selector means in response to a first code group of impulses for selecting a first selected pivot point for said function control lever whereby the same operates to cause the axial movement of said typewheel to place a first predetermined row of said type elements in the printing plane, means controlled by said selector mechanism in response to a second code group of impulses for selecting a second selected pivot point for said function control lever whereby the same operates to cause the axial movement of said typewheel to place a second predetermined row of type elements in the printing plane, and means controlled by said selector mechanism by a part of following code groups of impulses with the second of said predetermined rows of type elements in the printing plane for placing a fourth predetermined row of type elements in the printing plane.

4. In a telegraph receiver selectively controlled in response to received code groups of impulses, an axially movable typewheel having a plurality of more than two circumferential rows of type elements thereon, said typewheel being movable to place said rows of elements one at a time in a printing plane, a cyclically operable function control lever normally pivotable about a predetermined point, a selector means, means controlled by said selector means in response to a first code group of impulses for selecting a first selected pivot point for said function control lever whereby the same operates to cause the axial movement of said typewheel to place a first predetermined row of said type elements in the printing plane, means controlled by said selector mechanism in response to a second code group of impulses for selecting a second selected pivot point for said function control lever whereby the

same operates to cause the axial movement of said typewheel to place a second predetermined row of type elements in the printing plane, and means including said selector mechanism as controlled by following code groups of impulses with said first row of type elements in the printing plane for placing a type element from said first predetermined row or from a third predetermined row in printing position.

5. In a telegraph receiver selectively controlled in response to received code groups of impulses, an axially movable typewheel shaft, a typewheel fixed to said shaft and having a plurality of more than two circumferential rows of type elements thereon, said typewheel shaft being axially movable to place said rows of type elements one at a time in a printing plane, a cyclically operable function control lever normally pivotable about a predetermined point, a selector means, means controlled by said selector means in response to a first code group of impulses for selecting a first selected pivot point for said function control lever whereby the same operates to cause the axial movement of said shaft to place a first predetermined row of said type elements in the printing plane, means controlled by said selector mechanism in response to a second code group of impulses for selecting a second selected pivot point for said function control lever whereby the same operates to cause the axial movement of said shaft to place a second predetermined row of type elements in the printing plane, and means including said selector mechanism as controlled by following code groups of impulses with said second row of type elements in the printing plane for axially moving said shaft to place a type element from said second predetermined row or from a fourth predetermined row in printing position.

6. In a printing telegraph machine, a typewheel axially movable to place any one at a time of a plurality of peripheral rows of type elements thereon in a printing plane, a cyclically operable cam, a pivotable lever operable by said cam for controlling the axial shifting of said typewheel a predetermined distance, selector means, and means including said selector means for shifting the location of the pivot of said pivotable lever for controlling the axial shifting of said typewheel a second predetermined distance.

7. In a printing telegraph machine, a typewheel axially movable to place any one at a time of a plurality of peripheral rows of type elements thereon in a printing plane, a cyclically operable cam, a pivotable lever operable by said cam for controlling the axial shifting of said typewheel a predetermined distance, selector means, means including said selector means for shifting the location of the pivot of said pivotable lever for controlling the axial shifting of said typewheel a second predetermined distance, and means including the pivoting of said lever by said cam and the shifting of the location of the pivot point thereof for axially shifting said typewheel to place any one of the peripheral rows of type elements thereon in the printing plane.

8. In a printing telegraph machine, a typewheel axially movable to place any one at a time of a plurality of peripheral rows of type elements thereon in a printing plane, a typewheel shifting mechanism including a cyclically operable cam and a pivotable lever, said cam being effective to pivot said lever to control said typewheel shifting mechanism to shift said typewheel, a first predetermined amount, and other means for operating said pivotable lever to control said typewheel shifting mechanism to shift said typewheel a second predetermined amount.

9. In a printing telegraph machine, a typewheel axially movable to place any one at a time of a plurality of peripheral rows of type elements thereon in a printing plane, a typewheel shifting mechanism including an operating member, a first and a second operating means for said member, said first and second operating means being adapted to operate said member to control said typewheel shifting mechanism to shift said typewheel distances of one and two increments respectively, and means including both said first and second operating means for controlling said typewheel shifting mechanism to shift said typewheel a distance of three increments.

10. In a printing telegraph machine, a typewheel axially movable to place any one at a time of a plurality of peripheral rows of type elements thereon in printing position, an operating member, a selectively controlled means for selecting first and second degrees of operation of said member, means for operating said member the degree determined by said selectively controlled means, means controlled by said member when operated said first degree for placing predetermined of said rows of type elements in printing position, and means controlled by said member when operated said second degree for placing others of said rows of type elements in printing position.

11. In a printing telegraph machine, a typewheel axially movable to place any one at a time of a plurality of peripheral rows of type elements thereon in printing position, an operating member, a first selectively controlled means for selecting first and second degrees of operation of said member, means for operating said member the degree determined by said selectively controlled means, means controlled by said member when operated said first degree for placing a first predetermined one of said rows of type elements in printing position, means controlled by said member when operated said second degree for placing a second predetermined one of said rows of type elements in printing position, a second selectively controlled means, and means including said second selectively controlled means and dependent upon the degree of movement of said operating member for placing third and fourth rows of type elements in printing position.

12. In a telegraph receiver, an axially movable typewheel with a plurality of circumferential rows of type elements thereon, a cyclically operable function control lever normally pivoting a first predetermined amount, selectively controlled means for causing the pivoting of said lever second and third predetermined amounts, means controlled by said lever in pivoting said second predetermined amount for axially moving said typewheel to place predetermined of said rows of type elements in the printing plane, and means controlled by said lever in pivoting said third predetermined amount for axially moving said typewheel to place the others of said rows of type elements in the printing plane.

13. In a telegraph receiver, an axially movable typewheel with a plurality of circumferential rows of type elements thereon, a cyclically operable function control lever normally movable in a first path of movement, selectively controlled means for causing the movement of said lever in second and third paths of movement, means controlled by said lever when moving in said second path of movement for axially moving said

typewheel to place a first predetermined row of type elements in the printing plane, and means controlled by said lever when moving in said third path of movement for axially moving said typewheel to place a second predetermined row of type elements in the printing plane.

14. In a printing telegraph machine, a typewheel axially movable to place any one at a time of a plurality of peripheral rows of type elements thereon in a printing plane, a cyclically operable pivoting member, selectively controlled means for changing the pivot point of said member from a normal to either one of the other of two selected positions, means controlled by said member with the pivot point thereof at one of said selected points for controlling the axial movement of said typewheel to place predetermined of the peripheral rows of type elements thereon in the printing plane, and means controlled by said member with the pivot point thereof at the other one of said selected points for controlling the axial movement of said typewheel to place the other of said peripheral rows of type elements in the printing plane.

JAMES W. LONG.
GEORGE I. ROBERTS.