Aug. 6, 1957 E. E. KLEINSCHMIDT 2,802,048

SELECTING AND PRINTING APPARATUS

Filed Aug. 31, 1950 6 Sheets-Sheet 1

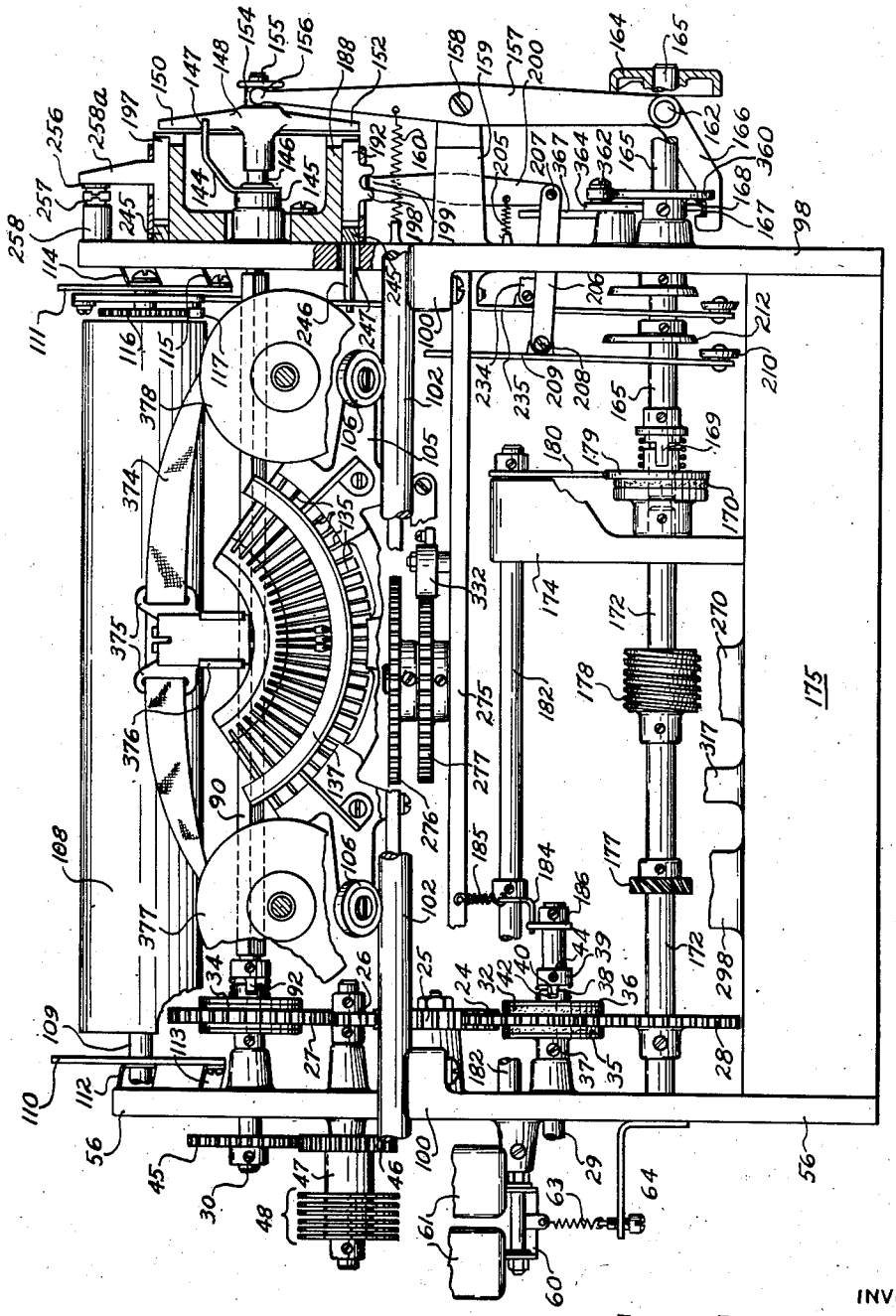


Fig. 1

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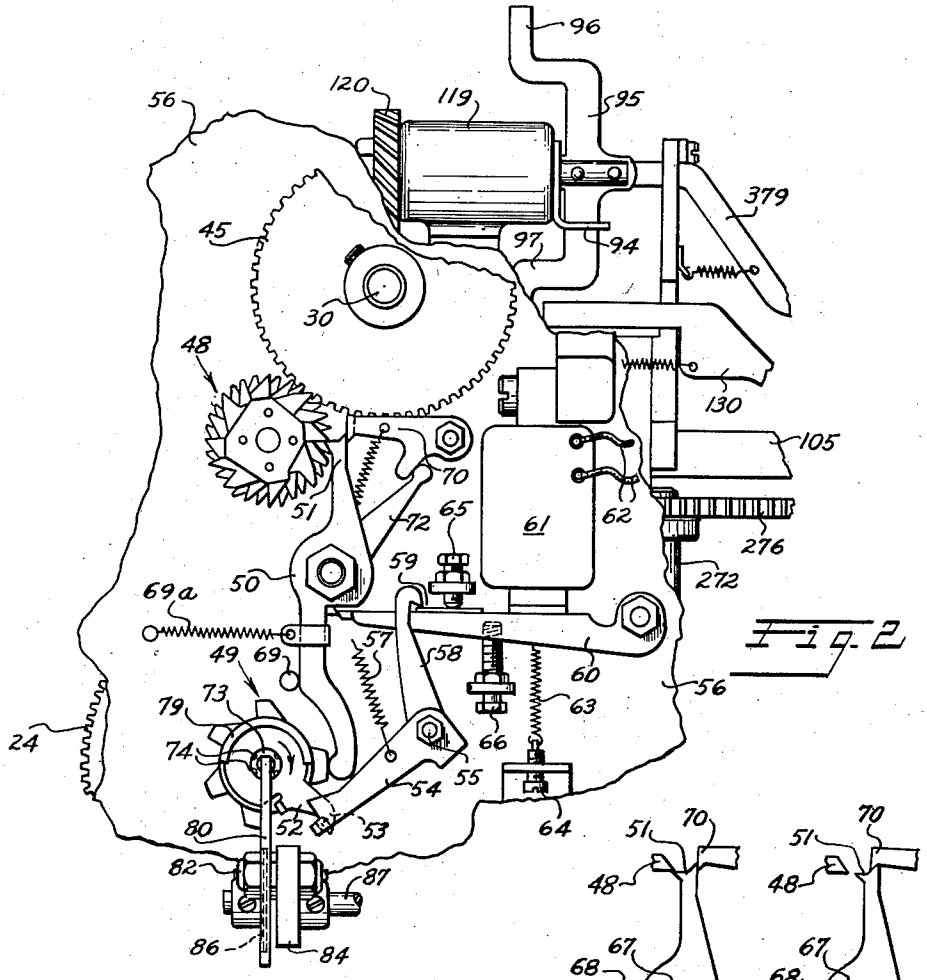


Fig. 2

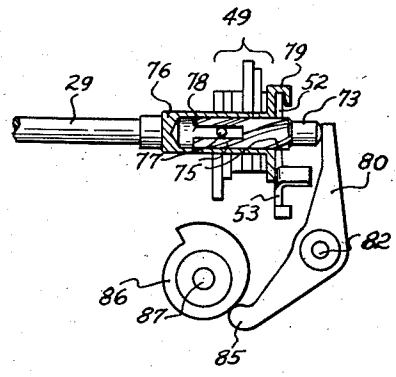


Fig. 5

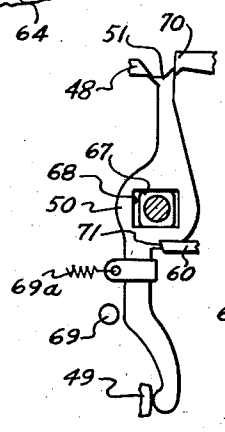


Fig. 3

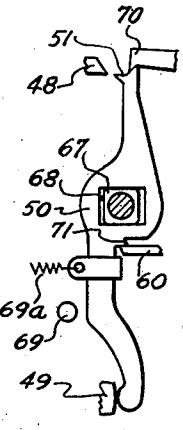


Fig. 4

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SELECTING AND PRINTING APPARATUS

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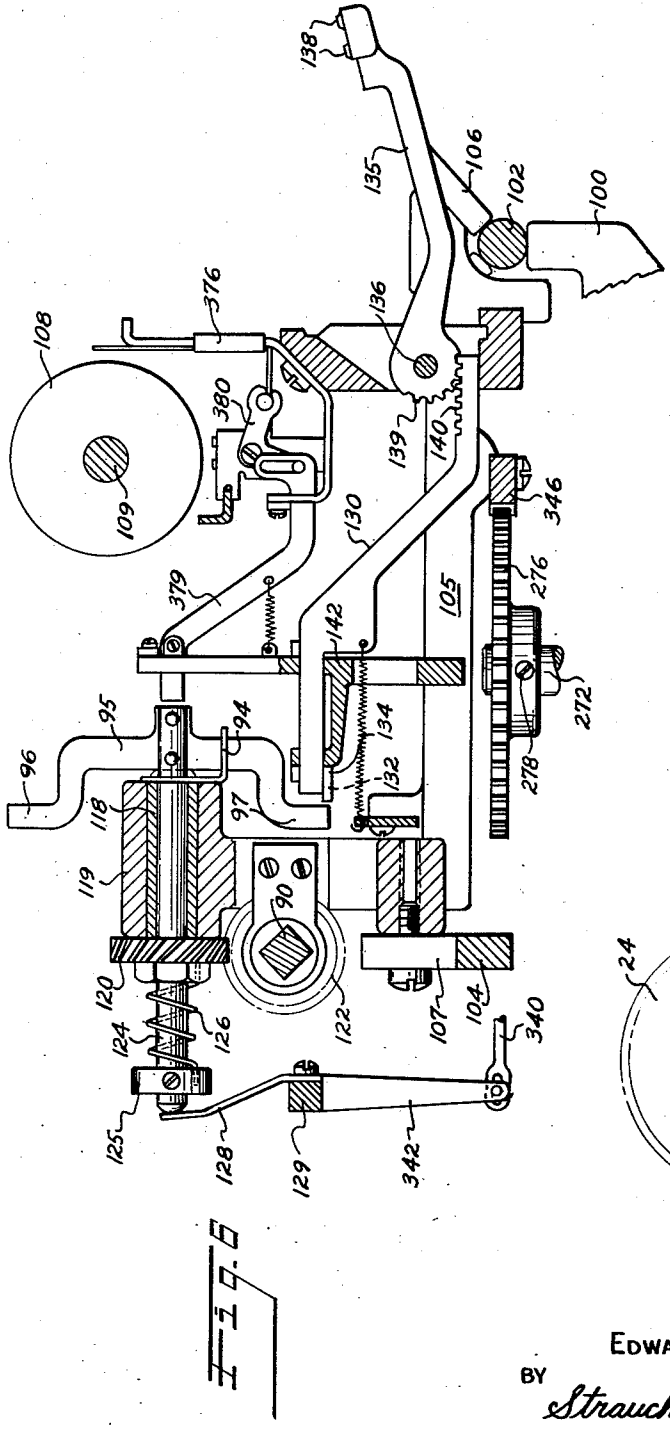


FIG. 8

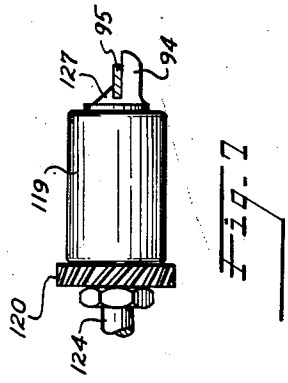


FIG. 7

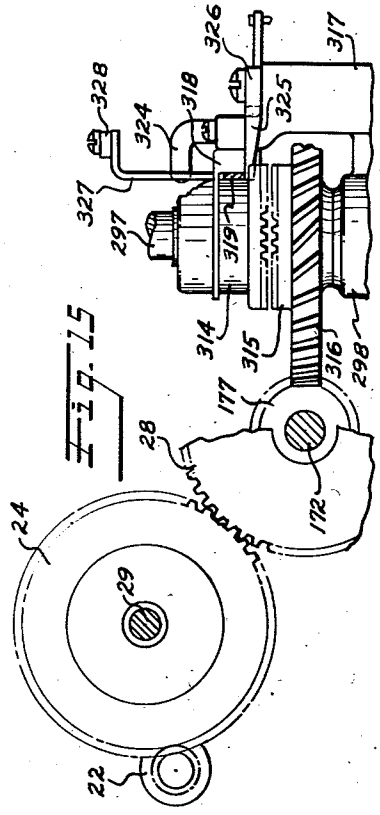


FIG. 15

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SELECTING AND PRINTING APPARATUS

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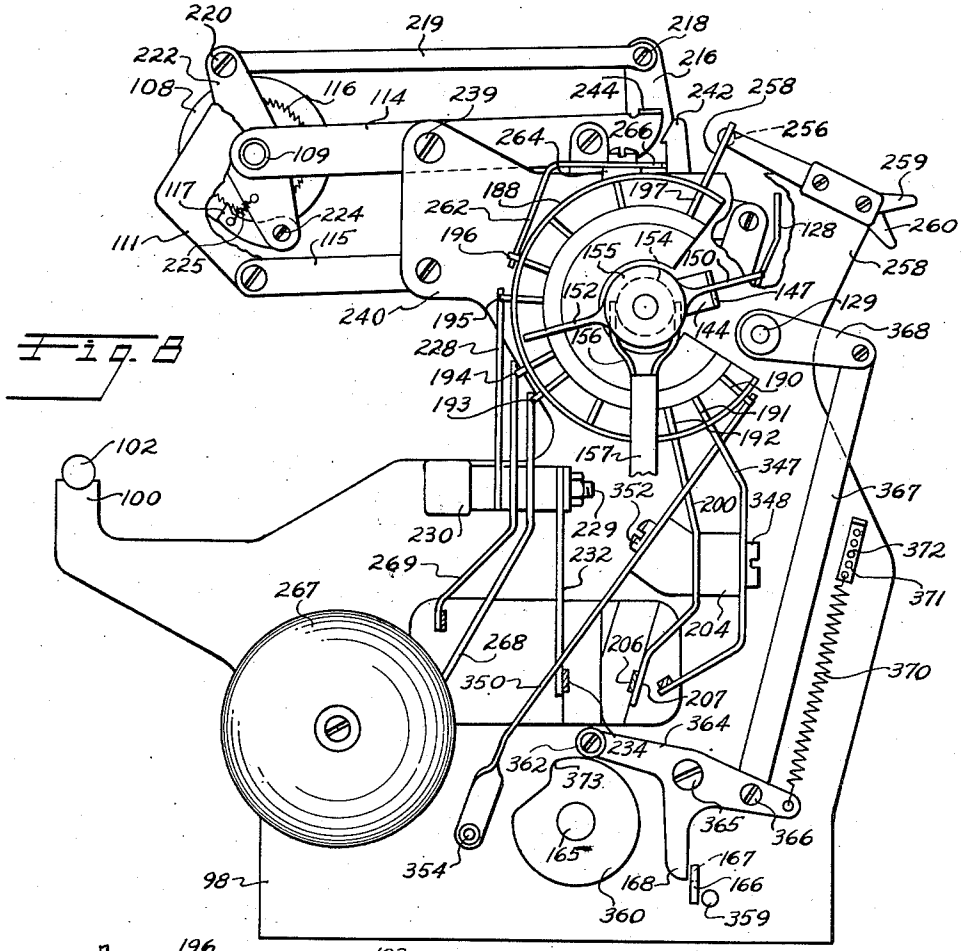


Fig. 8

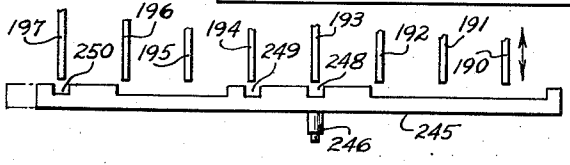


Fig. 11

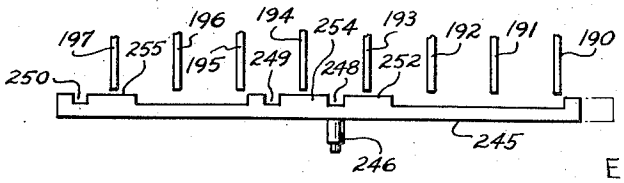


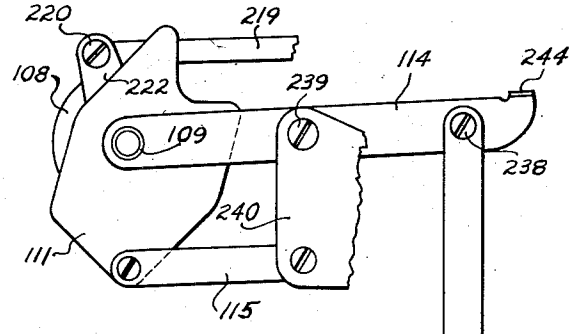
Fig. 12

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SELECTING AND PRINTING APPARATUS

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Fig. 10



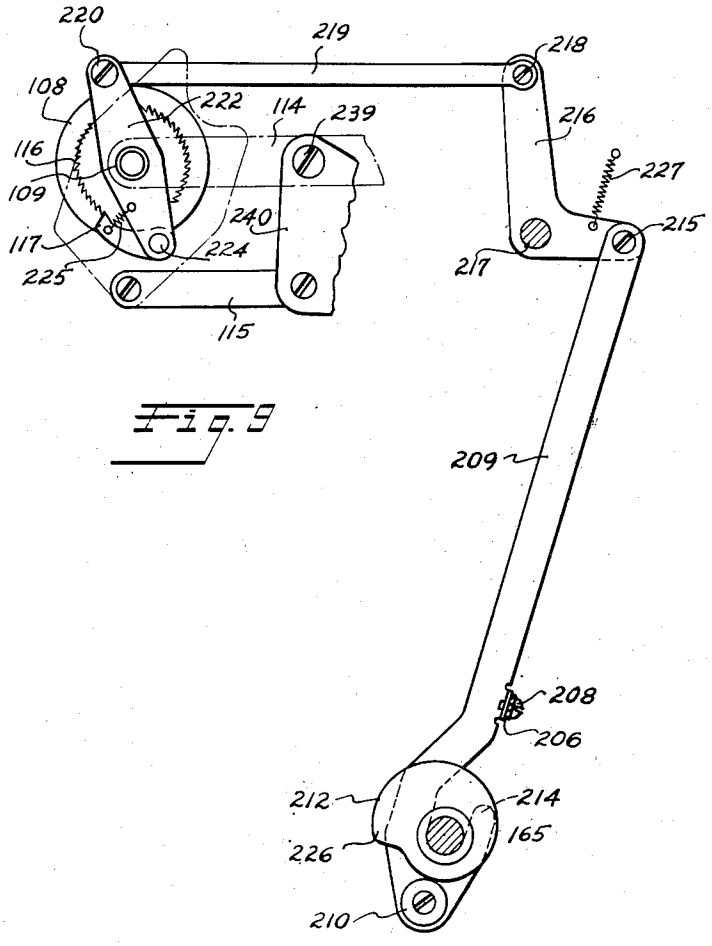


Fig. 9

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SELECTING AND PRINTING APPARATUS

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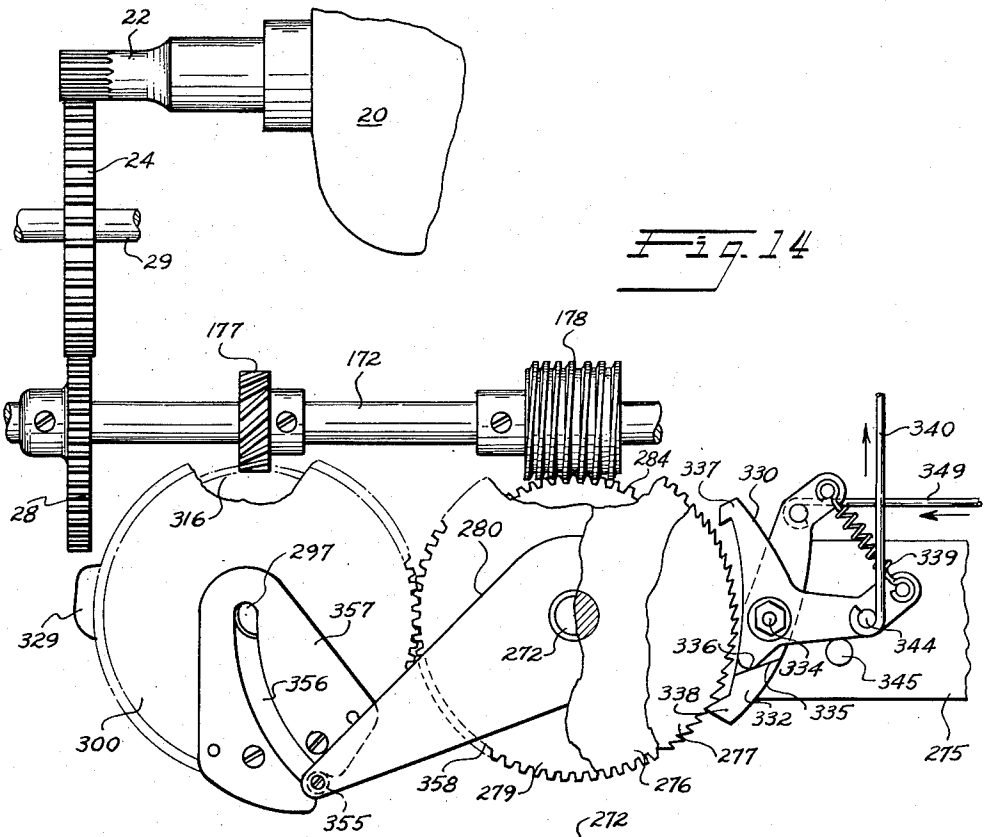


Fig. 14

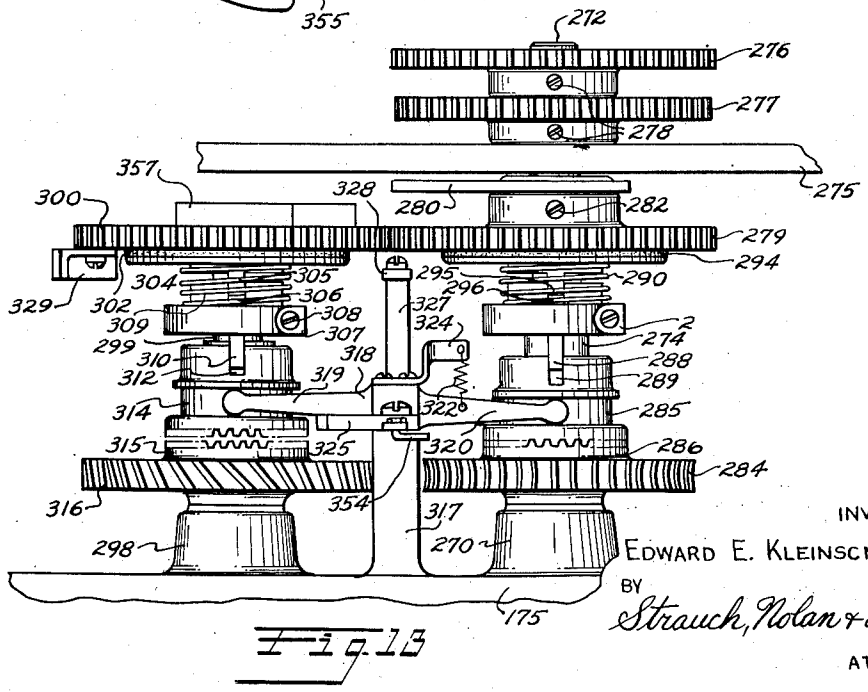


Fig. 13

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United States Patent Office

2,802,048

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2,802,048

SELECTING AND PRINTING APPARATUS

Edward E. Kleinschmidt, Miami Beach, Fla.

Application August 31, 1950, Serial No. 182,514

43 Claims. (Cl. 178—23)

This invention relates to selecting and printing apparatus for use in telegraph circuits and, more particularly, to apparatus of the type in which the selection of the characters to be printed is controlled by permutation code signals.

In such systems the selecting and printing apparatus is actuated under the control of two different line conditions arranged in groups which comprise a code to effect the printing of the character which corresponds to the current grouping or signal transmitted. Such systems are known as start-stop systems because the receiving apparatus is kept in synchronism with the sending apparatus and the incoming line signals by starting the receiving apparatus in response to a start signal, in this case a no-current condition, preceding the code group, and stopping it in response to a stop signal or current condition of the line.

As is well known in the art it is advantageous and desirable in all such systems to provide a receiving apparatus comprising a telegraph printer which is positive and reliable in its operation, capable of being operated at high speeds and yet at the same time consists of comparatively few simple parts to reduce the overall weight to a minimum and eliminate wearing parts. Accordingly, it is a prime object of this invention to provide a novel telegraph printer embodying these desirable general characteristics.

In the past, in apparatus of this class, it has been the practice to provide power operated means to move either the type bar carriage or platen carriage in one direction and at the same time store energy in a spring which, upon disconnection of the power means, moves the carriage in the opposite direction. In certain instances the power means were used for moving the carriage for the purpose of character spacing and the spring means for returning the carriage to its start position. In other variations the power means returned the carriage and the spring means provided the energy for character spacing. These arrangements required a very nice balance between the spring force and the weight of the movable carriage so that it would be promptly and completely returned to its starting position without excess shock as the carriage reached that position. Various types of shock absorbers were used to check or cushion this return movement but none of these arrangements gave completely satisfactory service when the apparatus was used aboard a ship or in an airplane where the apparatus could not be fixed in a horizontal position. When tilted from the horizontal the influence of gravity destroyed the required nicety of balance between the movable carriage and its supported parts and the force of the spring. This resulted in an uncertain, undependable and often undesirable return movement of the carriage. It is accordingly a more specific object of this invention to overcome these deficiencies of the prior art by providing a printing telegraph in which the movable type carriage is moved by power means in both the character spacing and return directions,

and shock is effectively eliminated by utilizing the power means to decelerate the return movement of the carriage.

In addition to the printing of characters telegraph printers must be arranged to receive and respond to certain functional selections such as line feed, carriage return, letter shift, figure shift, motor stop, and call bell. In the past these operating functions usually were selected and then operated through the same means that operated the printing bars and were often carried by the movable carriage with the resultant added weight making the carriage cumbersome and its movement difficult to control. Therefore, it is another important object of this invention to provide a novel arrangement in a telegraph printer in which the selecting and operating means for functional operations have been removed from the movable carriage to reduce the weight of the carriage and thereby increase the overall operating efficiency of the apparatus.

In the telegraph printers of the prior art the methods of transferring the code group set up in the selector mechanism to the typing mechanism have always been complicated requiring many machine parts, and in many types of apparatus, this transfer has been slow or unreliable. It is accordingly a further specific object of this invention to provide on the movable type carriage of a telegraph printer a novel rotary type bar selecting spider which is positioned directly from a square shaft connected to a stationary selector mechanism and which is actuated by a single bail to directly operate the selected type bar, thereby eliminating many of the machine elements employed in the prior art.

As is well known in the art, it is necessary to provide a printing telegraph with a range adjusting or orientation means to compensate for varying line condition which may adversely affect the operation of the printer. Heretofore it has only been possible to make this adjustment while the machine is not operating. It is therefore a still further object of this invention to provide in a telegraph printer a novel range adjusting means operable while the machine is in operation to accurately compensate for varying line conditions.

It is another object of the invention to provide a function selection spider directly operated from a selector mechanism by the same square shaft which positions the type bar selecting finger, and to provide a function blocking ring to prevent the operation of certain of the function operations when certain print characters have been selected.

A further object of the invention is to provide in the selector mechanism of a telegraph printer a selector lever-armature locking arrangement to insure completion of the selector lever motion even though the magnet has in the meantime become deenergized.

A still further object of the invention is to provide a novel type carriage mounting arrangement enabling balanced support and ease of movement of the carriage.

Other objects and advantages will be apparent from the following description in conjunction with the accompanying drawings and from the appended claims. The accompanying drawings in which like reference numerals are used to designate similar parts throughout illustrate the preferred embodiments for the purpose of disclosing the invention. The drawings, however, are not to be taken in a limiting or restrictive sense since it will be apparent to those skilled in the art that various changes in the illustrated construction may be resorted to without in any way exceeding the scope of the invention.

In the drawings:

Fig. 1 is a front elevation of a preferred embodiment of the invention with some of the parts removed to disclose the function operating cams and clutches;

Fig. 2 is a cutaway elevation of the sleector end of the apparatus disclosed in Fig. 1;

Figs. 3 and 4 are detail views showing the operational relationship between a selector lever and the electromagnet armature;

Fig. 5 is a detail view, partly in section, of the orienting or range adjusting means;

Fig. 6 is a side elevation, partly in section, of the type bar selecting and operating means;

Fig. 7 is a detail view of the latching means provided to prevent undesirable movement of the type bar selecting finger;

Fig. 8 is an elevation of the function selecting end of the invention showing the function operating levers;

Fig. 9 is a detail view of the line feed cam and operating mechanism therefor;

Fig. 10 is a detail view of the platen shift cam and operating mechanism therefor;

Fig. 11 is a schematic plan view of the function blocking ring in shifted position;

Fig. 12 is a schematic plan view of the function blocking ring in unshifted position;

Fig. 13 is a front elevation of the power drive gears and clutches which control the movement of the type carriage;

Fig. 14 is a plan view of the decelerating means, and pawl arrangement for the carriage spacing movement; and

Fig. 15 is a detail view of the spacing clutch and actuating means therefor.

In the preferred embodiment of my invention as illustrated in the drawings operating power is supplied by a suitable electric motor **20** (Fig. 14) which has secured to its shaft a drive pinion **22**. Pinion **22** is in mesh with a driving gear **24** which in turn drives a train of gears **25**, **26** and **27** and the gear **28** (Fig. 1), respectively. Gears **24** and **27** are loosely mounted on shafts **29** and **30** respectively, and tend to rotate said shafts through the friction clutches **32** and **34**. Shaft **29** is the stop shaft carrying the selector cams as will be explained; it is rotated by the friction clutch **32** which is pressed against constantly rotating gear **24** by friction disks **35** and **36**. Friction disk **35** is fastened to shaft **29** as by a set screw **37**, while friction disk **36** is spring pressed by spring **38** as shown to provide friction tension against gear **24** and is connected to shaft **29** by a collar **39** which has a projection **40** engaging a slotted portion **42** in an extension of slotted disk **36**, as is common in such construction. The collar **39** is secured to the shaft **29** as by a set screw **44**. The friction clutch **34** is similar to clutch **32** and is spring pressed in the same manner against constantly rotating gear **27**.

Rigidly secured to the shaft **30** at the left end thereof, as viewed in Fig. 1, is a gear **45** which drives gear **46** fixed to a sleeve **47** upon which is supported the stop wheel assembly generally indicated at **48**. Upon shaft **29** is fixed a selector cam assembly generally indicated at **49** (Fig. 2) which consists of a plurality of cams adapted to cooperate with a plurality of spring-biased selector levers **50** the ends **51** of which are associated with the stop assembly **48**. The stop wheel assembly, selector cam assembly and associated levers comprise the selector mechanism which is disclosed in detail in my U. S. Patent No. 2,192,351, issued March 5, 1940, and accordingly will be only briefly described herein. A stop plate **52** in the cam assembly is provided with an arm **53** to engage a stop lever **54** pivoted upon a stud **55** secured in a side member **56** of the machine frame. A spring **57** secured to side member **56** and lever **54** acts upon the lever to normally hold an upward extension **58** thereof against the end of a shoulder **59** fixed to the armature lever **60** of an electromagnet **61**. The electromagnet **61** is supported upon side member **56** by any suitable means and is connected in the conventional manner to a transmitting telegraph circuit by wires **62**. In accordance with the present practice of operating this type of telegraph receiver it is normally energized and holds armature lever **60** in the position shown in Figure 2 in which position cam assembly **49** is held against rotation. A spring **63** is secured to armature **60** as shown and an adjusting screw **64** is provided for placing variable tension upon the armature. Adjusting screws **65** and **66** are also provided to limit the extent of movement of the armature **60**. The electromagnet **61**, cam assembly **49**, stop wheel assembly **48** and related levers comprise the means for selecting the particular type bar or function which it is desired to operate.

As is well-known in the art, a group of start-stop permutation code signals by which it is intended to operate this receiver, consists of a start signal, five selecting signals, and a stop signal. The start signal is an interruption in the circuit and the stop signal is a closing of the circuit. The five selecting signals are either current or no-current, depending upon the characters to be selected, as for instance, the letter "A" consists of two current and three no-current signals. The start signal deenergizes electromagnet **61** which releases armature lever **60** thereby permitting stop lever **54** to release arm **53** on stop plate **52** and permit shaft **29** and cam assembly **49** to rotate with gear **24**. Gear **24** is revolved by motor **20** at a constant speed and in approximate timed relation with the speed of a signal transmitter, not shown. Gear **24** tends to rotate shaft **29** through friction clutch **32** but the shaft is normally held stationary by the arm **53** on stop plate **52** engaging stop lever **54**. When the cam assembly **49** is rotated the plurality of cams successively engage the associated levers **50** to cooperate with armature lever **60** and position the stop wheel assembly **48** in accordance with the code transmitted.

As will be best seen from Figs. 3 and 4 each selector lever **50** is mounted on a shoe **67** and has an elongated rectangular bearing aperture **68** to permit a certain amount of displacement as well as rotation at the bearing point. In normal position levers **50** are held with the right side of the apertures **68** bearing against shoe **67**, and the left edge of the levers bearing against a stop **69**, the levers being held in that position by springs **69***a* (Fig. 2). As each lever **50** is successively engaged by its cam **49** it will be positioned either in its selected position as shown in Figure 3 or in its unselected position as shown in Fig. 4, depending upon the signal received by magnet **61**. If the signal received is a current impulse, armature **60** will be attracted and the lever **50** will be forced by its cam **49** to pivot about the end or fulcrum portion of armature **60** as shown in Fig. 3 so that its left edge will be forced out of contact with stop **69**, the aperture **68** being slightly displaced with reference to shoe **67**. In this position it will be noted that a latch lever **70** holds the upper end of lever **50** in its selected position so that it will be engaged by a stop on its corresponding stop wheel **48**. Each of the selecting levers **50** is preferably formed with a notch **71** to facilitate engagement by the fulcrum end of armature **60**. The engaging faces of the notch and the fulcrum are formed so that the fulcrum will be locked to prevent movement thereof when they are in engagement. This feature is to insure the completed motion of lever **50** after it has engaged with the fulcrum regardless of whether or not magnet **61** has in the meantime become deenergized. Likewise the outer face of notch **71** will prevent the fulcrum from moving after lever **50** has been moved slightly to the right (Fig. 4), thereby insuring completion of the rightward movement of the lever regardless of whether or not the magnet **61** becomes energized before such movement is completed. This arrangement of the faces of the armature fulcrum and notch **71** makes possible in apparatus of the type described herein an operation which is termed point selection, without requiring special means therefor.

In Fig. 4 which represents the unselected position of

lever 50 wherein magnet 61 has received a no-current signal and armature 60 is released, cam 49 has forced the lever out of engagement with stop 69 and aperture 68 is displaced with reference to shoe 67. Since the armature fulcrum is out of engagement with lever 50, the lower end of the lever moves to the right about latch lever 70 as a pivot.

The particular stop wheel assembly 48 (Fig. 2) disclosed herein has thirty-two separate stop positions, including the normal or rest position of the apparatus, and these stop positions are arranged progressively on the stop wheels, there being one stop wheel for each selector lever 50. The stop wheels 48 coact with a normal stop lever (not shown), a release lever 72 and the selector levers 50 as explained in detail in Patent No. 2,192,351, cited hereinbefore, to enable the selection of the proper type bar in a manner to be hereinafter described.

It is desirable and advantageous in start-stop telegraph systems to provide orienting or range finding means to vary the stop or rest position of the cam assembly 49 relative to the selector levers 50 to compensate for changing line conditions which vary the length and effectiveness of the signal impulses. As is well-known in the art the mid-portion of the signal impulse is the most effective, and the orienting or range finding means enables the operator to set the selector cams 49 in the proper position to operate the selector levers 50 at the exact mid-portion of the signal impulse. The stop plate 52 is loosely mounted on a spirally grooved plunger 73 (Figs. 2 and 5) and has ears 74 which fit into the plunger grooves 75. The selector cam shaft 29 has an enlarged end portion 76 which is hollowed out as shown to receive the plunger 73 and the plunger is fixed to rotate with the shaft 29 by means of a pin 77 which is fixed in the end portion 76 and passes thru a slot 78 in the plunger 73 to permit axial movement thereof. Excessive axial movement of the stop plate 52 is prevented by a cap 79, formed on the end portion 76, which surrounds the upper portion of the stop plate 52 to hold it in place.

The timing relationship between the selector cams 49 and the stop plate 52 is adjusted by altering the angular position of the plate 52 with respect to the cam shaft 29. Increasing the angle between the plate 52 and the cam lobes causes the cams 49 to operate the selector levers 50 later in the cycle. Decreasing the angle causes them to operate earlier. The angular position of the stop plate 52 is adjusted by moving plunger 73 in or out. The plunger 73 is prevented from rotating with respect to the cam shaft 29 by the key or pin 77. Thus, when the plunger 73 is moved axially the helical grooves 75 and ears 74 force the stop plate 52 to rotate. Axial movement of the plunger 73 is controlled by a range adjusting lever 80 pivoted on a stud 82 secured in a projection 84 of the frame member 56. The lower portion 85 of the lever 80 comprises a cam follower which follows a cam 86 fixed to a control shaft 87 to which is secured an adjusting knob (not shown).

If the operator adjusts the control knob so the cam 86 rotates in a clockwise direction as viewed in Fig. 5 the lever 80 will be rotated counterclockwise and force the plunger 73 into the hollow portion of the cam shaft 29. This will cause the stop plate 52 to turn directly, if it is not held, to increase the angle between it and the selector cams 49. If the cam 86 is rotated in a counterclockwise direction the low portion of the cam is presented to the follower 85. If the stop plate 52 is held, as it is for a stop signal, the friction driven rotation of the cam shaft 29 turns the pin 77 and plunger 73 to decrease the angle between the stop plate 52 and the lobes of the cams 49, until the plunger 73 again abuts range finder arm 80. During the reception of message signals plunger 73 tends to be forced out of the cam shaft 29 against the lever 80 because of the intermittent stopping of the stop plate 52 and the consequent friction drive of the cam shaft 29.

The range finder or orienting adjustment should be made only while the machine is running and receiving repeated "RY" signals. The knob on the shaft 87 should be turned in one direction until the signals fail and the position noted on a scale (not shown) associated with the knob; and then turned in the opposite direction until the signals again fail, whereupon the knob should be set at the midpoint. The range finder subject matter is disclosed and claimed in United States Patent No. 2,689,272.

It is the accepted practice in the art of telegraph printers to arrange the twenty-six letters of the alphabet and six function selections in a group of thirty-two known as the "Letter Shift" group for selection when the typewriter carriage is in its unshifted position and to arrange figures, punctuation marks, and other function selections in another group of thirty-two called the "Figure Shift" group for selection when the typewriter carriage is in its shifted position. As there are thirty-two possible stop positions of the stop wheel assembly 48, it is apparent that any character in either group can be selected in one cycle of the assembly. When the stop wheel assembly 48 is free to move, due to the positioning of one or more of the selecting levers 50, it will be rotated through gears 45 and 46, (Figs. 1 and 2) which are in a 2 to 1 relationship, shaft 30, friction clutch 34, and constantly rotating gear 27 until one of the stop wheels engages a stop lever 50 at which time the effect of the friction clutch is overcome and the stop wheel assembly remains stationary.

The shaft 30 is the end extension of a square positioning shaft 90 (Fig. 1) which also is rotated by gear 27, friction clutch 34 and a jaw clutch 92. Square shaft 90 will be rotated when the stop wheel assembly 48 is allowed to rotate but because of the 2 to 1 relationship between gear 45 and gear 46 associated with the stop wheel assembly 48 the square shaft 90 will turn only one-half the distance that the stop wheel assembly 48 turns. Therefore the square shaft 90 will make but one-half revolution for each full revolution of the stop wheel assembly 48. Associated with the square positioning shaft 90, through means to be described hereinafter, is a spider positioning finger 94 (Figs. 2 and 6) which coacts with a type bar operating spider 95 provided with two diametrically opposed legs 96 and 97. Finger 94 is directly geared to shaft 90 in such a manner that it is rotated as the shaft is rotated. Finger 94 in turn causes spider 95 to rotate, and in the course of one-half revolution of the shaft 90 one or the other of the spider legs 96 and 97 is positioned in all of the thirty-two possible selecting positions. Thus, it becomes possible in the course of a complete revolution of the shaft 90 to make two selections rather than one as has been the practice of the prior art. Since there are only twenty-six type bars it will be understood that the legs 96 and 97 will be positioned in six positions in each half revolution of shaft 90 in which there are no type bars to be selected, however in these remaining positions non-printing functions are selected by other means, as will be hereinafter described, and the finger 94 and spider 95 are ineffective.

As shown in Figs. 1 and 8, the frame side members 56 and 98 are provided with forwardly extending arms 100 to which is attached a carriage supporting rod 102. A carriage supporting bar 104 (Fig. 6) extends between the side members 58 and 98 and is supported thereby. A reciprocating carriage 105 is supported on the rod 102 by rollers 106 and on the bar 104 by a roller 107. The rollers 106 and 107 are secured to the movable carriage 105 by any suitable means and the angular displacement of the rollers 106 and other cooperating means not shown serve to keep the carriage 105 on the rod 102 and bar 104. A platen roller 108 (Figs. 1, 8, 9 and 10) is carried by a shaft 109 supported by end plates 110 and 111 and link members 112, 113, 114 and 115 and is provided

with ratchet 116 and pawl 117 for line advance in a manner hereinafter described. Spring pressed paper rollers may be provided, if desired, to cooperate with the platen roller 108, and a paper shield may also be provided for guiding paper into the printer to keep it free of the operating mechanism.

The spider positioning finger 94 (Figs. 2 and 6) is mounted on a hollow shaft or sleeve 118 carried by a hub 119 of the carriage frame 105 and is geared to the stop wheel assembly 48 through a worm gear 120 fixed on sleeve 118, a worm gear 122 slidable on square shaft 90, gear 45 and gear 46 (Fig. 1). The type bar operating spider 95 (Fig. 6) is secured rigidly to a plunger 124 loosely supported within the sleeve 118. A collar 125 is adjustably secured on the plunger 124 and a spring 126 is fastened on the collar 125 and gear 120 in such a manner that it will tend to move the plunger 124 to the left as shown in Fig. 6 and also tend to rotate the plunger so that one of the legs of the spider 95 will always tend to engage positioning finger 94. A latch 127 (Fig. 7) is provided on finger 94 to hold spider 95 when it is returned, by the torque action of spring 126, to its normal position against the finger after actuating a type bar and thereby prevents any rebound of the spider 95.

The spider 95 is moved to the right (Fig. 6) to actuate a selected type bar by means of a printing bail 128 mounted on a printing shaft 129, both of which extend the length of the printing line. When spider 95 has been moved a sufficient distance to clear the latch 127, the finger 94 is freed for rotation in association with the stop wheel assembly 48 and can assume the next selecting position. Finger 94 is then rotated to bring it into selected position opposite a type push bar 130 by positioning the stop wheel assembly 48 in conjunction with selector levers 50. The spider 95 when released by the printing bail 128 moves to the left (Fig. 6) and is released from a centering notch 132 arranged in a ledge 134 of the carriage frame 105 in alignment with the adjacent end of push bar 130, whereupon it will be rotated by spring 126 until it again latches on the finger 94.

The above arrangement permits the elimination of a large number of parts by utilizing the selecting spider to select the desired type bar push bar and also operate it under the control of a single printing bail instead of the usual setting bail and a separate operating bail. The rapidity of operation is greatly increased by reason of the fact that the selecting finger may start on its next selection while the spider is engaged in completing the typing of the last previously selected character. The time element is so arranged that the spider 95 will always be in position on the finger 94 when the next printing motion starts. This feature permits the use of a selecting mechanism in which the usual overlap period is eliminated since it is necessary to hold the stop wheel assembly 48 for only a minimum of time, permitting it to again revolve to the next selected position without waiting for complete operation of the printing function.

The type bars 135 (Figs. 1 and 6) are pivoted on rod 136 which is of arcuate shape to permit the bars 135 to be supported in a manner common in typewriters by an arcuate shaped bracket 137 secured to the carriage frame 105. Each type bar 135 has two type characters 138 corresponding to the unshift and shift positions of the carriage, and each is provided with gear teeth 139 arranged to engage racks 140 on push bars 130 which may be held in place in any suitable manner such as by comb 142 secured to the carriage frame 105. Twenty-six type bars 135 and push bars 130 are provided. Push bars are not provided for the non-printing functions as they are completed through other means. The operation of the non-printing functions is effected through a function selecting finger 144 (Figs. 1 and 8) which is rigidly secured by a collar 145 to an extension 146 of the square shaft 90. The finger 144 rotates with the square shaft 90 and assumes positions corresponding to the various positions of the stop wheel assembly 48 and positioning finger 94.

The function selecting finger 144 has a forked end 147 (Fig. 8) into which is fitted a function actuating spider 148 slidably supported on the extended rounded portion 146 of the square shaft 90 but rotatable therewith by means of finger 144 to assume a selected position. Diametrically opposed legs 150 and 152 are formed on the spider 148 which also has an integrally formed hub 154 (Figs. 1 and 8) with an enlarged end 155. Around the hub 154 is fitted the bifurcated end 156 of function lever 157 which is pivoted at 158 on an extending portion 159 of the frame member 98. A spring 160 fastened to the frame 98 and to the function lever 157 pulls the upper end of the lever (Fig. 1) to the left except when it is prevented from doing so by the spider 148 or by a cam roller 162, secured to the lower end of lever 157, engaging the cam face of a function cam 164 secured to the function power shaft 165. Function lever 157 has an integrally formed laterally extending portion comprising print block lever 166, provided with a notch 167 near its end, adapted to permit the operation of a printing lever 168 during a printing operation and block the printing lever 168 during a functional operation as will be described hereinafter.

Function power shaft 165 is journalled in side frame 98 and is associated through a jaw clutch 169 and a friction clutch 170 with a drive shaft 172 supported in side frame 56 and a standard 174 secured in any suitable manner to the bottom cross plate 175 of the machine. The gear 28 is fixed to drive shaft 172 and is constantly driven by gear 24. Also fixed to shaft 172 are worm gears 177 and 178 which drive the power means for moving the type bar carriage 105 as will be described later. The function power shaft 165 normally is held at rest by a latch disk 179 fixed to shaft 165 and engaging the hooked end of a latch 180 which is fixed to a function clutch trip shaft 182 which is supported in standard 174 and side frame 56. Also fixed to shaft 182 is a trip cam follower 184 which has a spring 185 fastened to it and to the frame of the machine in such manner as to cause the hooked end of latch 180 to engage latch disk 179 to prevent the shaft 165 from rotating.

A trip cam 186 is fastened to selector shaft 29 and is so positioned that immediately after the fifth pulse of the character code is received by the selector mechanism the high spot on the trip cam 186 will hit the cam follower 184 and cause the shaft 182 to rotate enough to move the latch 180 out of engagement with latch disk 179 whereupon the friction clutch 170 and jaw clutch 169 will rotate the function power shaft 165 to cause the operation of the selected function or the printing of the selected character. The shaft 165 will revolve only once as the latch 180 will ride latch disk 179 until the cam and shaft 165 reach their normal stop position at which time the latch 180 will again engage the latch disk 179 and prevent it from rotating. The friction clutch 170 will thereupon slip and permit the shaft 172 to rotate while the shaft 165 is held stationary.

Supported on the frame member 98 in any suitable manner is a function push bar segment 188 (Figs. 1 and 8) which carries the function push bars which are namely; carriage return bar 190, spacing bar 191, line feed bar 192, call bell bar 193, motor stop bar 194, figure shift bar 195, letter shift bar 196, and auxiliary switch bar 197. When, by reason of its association with the stop wheel assembly 48, the function spider 148 has one of its legs 150 or 152 positioned opposite one of the function push bars, and the function cam 164 is rotated to a position which permits the cam roller 162 to move to the right (Fig. 1), the spring 160 will pull the upper end of lever 157 to the left so that the bifurcated end 156 riding on hub 154 will force the spider 148 to the left and either

leg 150 or 152 will enter a slot in the segment 188 in which the selected push bar is located and move the bar to the left to cause the functional operation desired through means hereinafter described. The face of the cam 164 is arranged to permit the cam roller 162 to move with a snap action under the impetus of spring 160. This snap action will also be imparted to the push bars through the spider 148. When the stop wheel assembly 48 has been positioned for a printing operation the spider 148 will be stopped in its movement to the left because its legs 150 or 152 will not be positioned opposite one of the slots in which a functional push bar is located but will be blocked in its movement by engaging the face of the push bar segment 188. The distance traveled by the function lever 157 is not sufficient to move the notch 167 into the path of the lever 168 so that lever 168 will not be blocked by the lever 166 and thus permit the printing operation to be explained.

Line feed

The means for producing several of the functions will now be described. For instance, the line feed and figure shift are operated by individual cams on the power shaft 165 (Fig. 1) into the path of which a depending operating link is pressed by the movement of a selected function push bar. The line feed function is accomplished when the spider 148 enters the slot in which push bar 192 is located and pushes it to the left (Fig. 1). The bar 192 has protrusions 198 which cooperate with the end 199 of a link bar 200 which pivots on a frame extension 204 (Fig. 8). A spring 205 (Fig. 1) is provided to yieldingly hold the link bar 200, push bar 192, and the associated parts in the positions shown in Fig. 1. Another link bar 206 is pivoted at 207 to bar 200, and at 208 to depending link 209 (Figs. 1 and 9) to the lower end of which is suitably fastened a cam roller 210 adapted to be moved into engagement with an edge cam 212 secured on the power shaft 165 and rotatable therewith.

The depending link 209 has its lower end formed into an offset hooked portion 214 as shown in Fig. 9 arranged to fit around the function power shaft 165 so that it will be kept in alignment with the shaft but will be permitted to move axially a short distance along it. The upper end of link bar 209 is pivoted at 215 to a bell crank 216 which is pivotally supported on a stub shaft 217 secured to side frame member 98. The upper arm of the bell crank 216 is pivotally linked at 218 to line feed link arm 219 which is linked at 220 to line pawl lever 222 rotatably mounted on the paper roller shaft 109. The line feed pawl or detent 117 is operatively associated with the lever 222 by pivot connection 224 and spring 225 which has one end fastened to the detent 117 and its other end secured on the lever 222.

Referring to Figures 1 and 9 of the drawings the operation is as follows. Function push bar 192 is moved to the left causing pivot lever 200 to move its lower end to the right and pull link 209 in the same direction to cause cam roller 210 to be moved into the path of cam 212. As the cam 212 is revolved by function power shaft 165 the cam roller 210 rides up on the high point 226 of the cam and depresses link bar 209 which rocks bell crank 216 about the shaft 217 to move line feed link arm 219 to the right (Fig. 9) to rotate line feed pawl lever 222 which by reason of the pawl 117 and ratchet 116 move the paper roller 108 one line space.

A spring 227 secured between the bell crank 216 and the frame is tensioned during the above movement and when the cam roller 210 falls from the high point 226 of the rotating cam 212 the spring rocks the bell crank in the opposite direction to the previous movement to move the pawl 117 into the next tooth of the ratchet 116 to condition it for the next line feed operation.

Function cam 164 and lever 157 are shown in their rest positions in Fig. 1. Function cam 164 is provided with a notch which when the cam starts rotating, will permit lever 157 to press spider 148 against either the function bars or the face of segment 188 for a very short interval of time, sufficient, however, to move link bar 209 as and when its push bar 192 is selected, so that its depending roller 210 will be brought into the path of cam 212 by which it is immediately engaged and held during its full operation, due to the angular faces of the cam and roller.

Platen shift

The mechanism for shifting the paper roller 108 vertically so as to print figures is very similar to that of the line feed mechanism. The figure shift push bar 195 (Fig. 8) when pushed by the spider 148 rocks link bar 228 which is rigidly secured to the shaft 229 journaled in a hub portion 230 of the side frame member 98. Also rigidly secured to the shaft 229 is a link bar 232 to which is pivoted connecting rod 234 which in turn is pivotally connected to depending draw bar 235 (Fig. 1 and 10) to the lower end of which is fixed cam roller 236 to engage the cam 237 on shaft 165. The upper end of draw bar 235 is pivotally connected at 238 to upper link member 114 which is pivotally supported at 239 on a supporting plate 240 fastened in any suitable manner to the side frame member 98.

When push bar 195 is actuated the connecting linkage moves the cam roller 236 into the path of cam 237 which forces the pull bar 235 downwardly, to cause link 114 to pivot about point 239 and raise paper roller 108 on shaft 109 carried by link arm 114. When the draw bar 235 has been moved to its extreme downward position a spring pressed latch 242 (Figure 8) engages the end 244 of link 114 to retain the paper roller 108 and associated parts in the shifted position.

End plates 110 and 111 (Figures 1, 8, 9, and 10) are provided as supports for the paper retaining means and also as connecting means for the parallel link members 112, 113, 114, and 115 which are devised and arranged in such a manner as to maintain the paper roller 108 in the same vertical plane during a shifting operation in either direction. The shaft 109 passes through orifices in the plate 110 and link 112 (Figure 1) on one end and through orifices in plate 111 and link 114 on the other end with sufficient room to permit the shaft 109 to rotate. The link member 115 (Figures 8, 9, and 10) has its ends pivotally secured to end plate 111 and support plate 240 while the link 113 (Figure 1) has its ends pivotally secured to the frame 56 and to end plate 110. The lower link arms 113 and 115 restrain the shaft 109 and its supporting apparatus from revolving in an arc about the pivot 239 when the link member 114 is rocked as it would do if the lower links 113 and 115 were not provided.

Function blocking ring

A function blocking ring 245 (Figure 1) is provided to permit certain functions to be performed when the function selecting spider 148 is turned to a position which also causes a type bar to be operated. The blocking ring 245 is located in the push bar segment 188 behind the push bars and is provided with cutaway portions as shown in Figures 11 and 12 to permit some of the function push bars, namely signal bell 193, motor stop 194, and auxiliary switch 197, to operate when the platen 108 has been shifted to the "Figures" or upper case position and to prevent or block their operation when the platen 108 is in its unshifted or "Letters" position. All the other function push bars will operate regardless of the position of the platen. The blocking ring 245 is a segment of an annular ring to fit in an annular channel in the segment 188 but is shown as flat in Figures 11 and 12 for easier description and understanding. A stud 246 is secured to the blocking ring 245 and protrudes through a slot 247 (Figure 1) in the segment 188 to engage the platen shift draw bar 235 so that when the bar 235 moves downwardly to shift the platen 108 to the "Figures"

position the blocking ring 245 will shift and present openings 248, 249, and 250 (Figure 11) to the push bars 193, 194, and 197, respectively. It is to be understood that in actual construction the stud 246 will be placed sufficiently high on the arc to move the blocking ring 245 when the draw bar 235 moves downwardly rather than at the bottom of the arc as shown for convenience in Figure 1. The platen 108 is held in the shifted position by the latch 242 (Figure 8); and the blocking ring 245, by reason of its connection through the stud 246 and bar 235, will at the same time be held in its shifted position as shown in Figure 11. When the platen 108 is released, by means to be described, and drops to the "Letters" or unshift position the draw bar 235 and blocking ring 245 will be moved to shift the ring to the position shown in Figure 12 with the high or closed portions 252, 254, and 255 blocking the push bars 193, 194, and 197, respectively. It is to be noted that the push bars for the carriage return (190), letter spacing (191), line feed (192), shift (195), and unshift (196), functions are always opposite low or open portions of the blocking ring 245 and will operate regardless of the position of the ring 245 and platen 108.

It is to be understood that when the spider 148 is positioned to operate the carriage return bar 190, letter spacing bar 191, line feed bar 192, shift bar 195, and unshift bar 196, the type selecting spider 95 is positioned opposite an open space and no type bar is operated. However, in the case of the functions which are effective only when the platen 108 is in its shifted or upper case position the type selecting spider 95 will select and operate a type bar 135 at the same time the function selecting spider 148 selects and operates the proper function push bar. The type bar 135 may be provided with a special type pallet 138 to print a symbol which will indicate the function operated or the upper character on the pallet 138 may be completely omitted.

Auxiliary switch

An auxiliary electrical switch comprising contacts 256 and 257 (Figure 1) is mounted upon, but insulated from, a frame projection 258 and may be operated momentarily upon the reception of the proper code signals which will position one of the legs 150 or 152 of the spider 148 in front of the push bar 197. As above explained the bar 197 cannot operate unless the paper roller 108 and the blocking ring 245 are in the shifted position. If the ring 245 is shifted the spider 148 will strike the end of bar 197 and move it and arm 258*a* to the left as viewed in Figure 1. The arm 258 will move the contact 256 into engagement with contact 257 to close momentarily an electrical circuit through conductors, not shown, connected to terminals 259 and 260 (Figure 8). As soon as the spider 148 moves away from the bar 197 the spring tension of the operated contact spring 256 will move it away from contact 257 and return the bar 197 to its normal position. If the blocking ring 245 is in its unshifted position the raised portion 255 will be in back of push bar 197 and prevent it from moving and closing the contacts 256 and 257.

Letter shift

The "unshift" or letter shift is operated when the corresponding selection sets stop wheel assembly 48 so that the function spider 148 has one of its legs 150 or 152 positioned opposite the letter shift push bar 196 (Figure 8). When the function cam 164 (Figure 1) rotates and releases cam follower 162 the spring 160 will cause function lever 157 to move the spider 148 and cause it to slap push bar 196 (Figure 8) which in turn will rock a bell crank letter shift release latch 262 on its pivot 264 on a portion of the machine frame to cause a rearwardly extending portion 266 of the latch 262 to strike the latch 242 and release it from end 244 of the link arm 114 whereupon the weight of the paper carriage will restore it to the letter printing position. If the machine is likely to be operated in positions where the weight of the carriage is not effective to restore the carriage, a spring, not shown, may be provided to issue proper action.

Call bell

A call bell 267 (Figure 8) is provided for the purpose of signalling the machine attendant and is secured to the frame 98 in any suitable manner. When the platen 108 and blocking ring 245 are shifted and the spider 148 hits the call bell function push bar 193 the imparted motion causes the function bar 268 associated therewith to pivot on the shaft 229, upon which it is loosely supported, to cause a clapper, not shown in the drawings, to strike the call bell 267. Spring means, not shown, may be provided to return the apparatus to its normal unoperated position.

Motor switch

A motor control switch of any satisfactory well known type may be provided and connected by link means, not completely shown, to the function bar 269 (Figure 8) and motor stop push bar 194. When the platen 108 and ring 245 are in their shifted position and the push bar 194 is actuated by spider 148 it rocks the function bar 269 on the shaft 229 to operate the motor control switch to stop the motor as is well known in the art.

Carriage movement

The type bar carriage 105 is spaced step-by-step during the printing operation by power drive means and is returned for the start of a new printing line by the power means to enable these functions to be effected positively and uniformly even when the printer is tilted in any direction by reason of the movement of the object upon which it is supported.

The power means for returning the type bar carriage and decelerating means, therefore, are fully disclosed in my copending application Serial No. 769,664 filed August 20, 1947, now Patent No. 2,606,641, dated Aug. 12, 1952, and, therefore, will be only briefly described herein.

Referring now to Figures 13, 14, and 15, the bottom cross plate 175 (Figure 13) of the machine frame is formed with a standard 270 in which the lower end of a spindle 272 is suitably secured to permit rotation. A sleeve 274 is mounted upon the spindle 272 for free rotatior relative thereto. The upper end of spindle 272 passes through a frame cross member 275 and to it a carriage drive gear 276 and a spacing ratchet 277 are securely fixed by some means such as set screws 278. Immediately below the cross frame member 275 a carriage return gear 279 and a decelerating arm 280 are rigidly secured to spindle 272, as by set screw 282.

A spacing drive gear 284 is mounted on the lower end of the sleeve 274 in rotatable relationship therewith, and is in constant mesh with worm gear 178 fixed to the shaft 172 which is constantly driven as explained hereinbefore through the gear train to the motor 20. A spacing clutch collar 285 is mounted on the sleeve 274 for sliding movement relative thereto and is adapted to cooperate with a complementary clutch member 286 carried by gear 284. Also co-operating with the clutch collar 285 is an adjusting collar 287 provided with diametrically opposed fingers 288 which enter slots 289 in the collar 285. The adjusting collar 287 may be moved vertically on the sleeve 274 to properly tension a spring 290 which engages the upper side of collar 287 and may then be clamped in position on the sleeve 274 by means of clamping screw 291. The other end of tensioning spring 290 bears against a friction disk 292 which loosely surrounds the spindle 272 and engages with friction material 294 at the underside of gear 279. Diametrically opposed fingers 295 attached to the friction disk 292 cooperate with slots 296 formed in the hub portion of collar 287 to cause the disk 292 to rotate with the sleeve 274. By vertical ad-

justment of the collar 287 on the sleeve 274 frictional resistance to the unitary rotation of gear 279 with the sleeve 274 may be regulated. The clutch members 285 and 286 form a positive drive connection, while the friction disk 292 and material 294 comprise a safety clutch which will prevent damage to the machine parts if spacing signals are received after the carriage has been moved to its extreme position.

In laterally spaced relation to the spindle 272, a second vertically disposed shaft 297 (Figures 14 and 15) is suitably fixed at its lower end in a standard 298, (Figure 13) and upon this shaft a sleeve 299 is supported by anti-friction bearings for free rotation. A gear 300 is loosely mounted on the upper end of the shaft and is held in position by a collar, not shown. Friction material 302 is placed at its underside and is adapted to engage a friction disk 304 loosely surrounding the shaft. The disk 304 has diametrically opposed fingers 305 which cooperate with slots 306 in the hub portion of an adjusting collar 307 which may be clamped by screw 308 in position on the sleeve 299 to tension the spring 309. The vertical adjustment of the collar 307 on sleeve 299 regulates the frictional resistance between the disk 304 and friction material 302 to effectively form a friction drive.

Diametrically opposed depending fingers 310 fastened to the collar 307 enter slots 312 in the hub of a clutch collar 314 to rotate the collar 314 and sleeve 299 upon which it is slidably mounted to cooperate with a complementary clutch member 315 carried by a gear 316 rotatably supported by anti-friction bearings on the shaft 299. Gear 316 is in constant mesh with gear 177 fixed to motor driven shaft 172.

In a frame standard 317 located between gears 284 and 316, a rock shaft 318 is mounted with an arm 319 arranged to operate sliding clutch collar 314 and an arm 320 adapted to operate sliding clutch collar 285, said operating arms 319 and 320 projecting from the relatively opposite sides of said shaft 318 and rotatable in a vertical plane about a pivot, not shown, in standard 317. A spring 322 connected to arm 320 and a spring holder 324 yieldingly urges clutch collar 314 into power transmitting engagement with the clutch member 315 but a latch 325 (Figures 13 and 15) pivoted at 326 normally prevents this engagement and instead holds the clutch collar 285 in mesh with clutch member 286, whereby the carriage drive gear 276 will be rotated to space the characters under the control of the printing bail 128, as will be explained.

An upwardly extending de-clutching lever 327 is a part of the rock shaft 318 and has its upper end 328 disposed in the path of movement of a peripheral extension 329 (Figure 13) on the gear 300 for engagement therewith in the final return movement of the type carriage 105 to its starting position.

The normal engagement of the complementary spacing clutch collar 285 and member 286 tends to rotate the spindle 272 and its supported parts against the holding or retaining action of two spacing pawls 330 and 332 (Figure 14) pivotally mounted upon a common supporting stud 334 fixed in the machine frame 275. The pawl 332 has a shoulder 335 on one side of the pivot 334 which abuts a cam lug 336 on the pawl 330 for cooperation therewith as will be explained. The toothed ends 337 and 338 of the respective pawls are normally biased into engagement with the teeth of spacing ratchet 277 by a spring 339 connecting the spaced ends of the said pawls, as shown in Figure 14 of the drawings.

A rod 340 is operatively connected to a link 342 (Figure 6) rigidly fastened to the printing bail 128 and is pivotally connected with the pawl 330 (Figure 14) as indicated at 344. A spring, not shown, connected to said rod 340 normally holds the pawl 330 in contact with a stop pin 345 in the machine frame 275. When the printing bail 128 moves to operate a type bar for the printing of a character as will be explained, the rod 340 is moved, pawl 330 is moved away from stop 345 and its toothed end 337 is engaged with a tooth of the spacing ratchet 277. At the same time the cam lug 336 on pawl 330 coacts with the shoulder 335 to move pawl 332 out of engagement with the spacing ratchet 277 thus allowing said ratchet to move a partial distance of one tooth, at which time the pawl 330 is engaged by a ratchet tooth to hold the ratchet 277 against further rotation. As the pawl 332 is disengaged from the ratchet 277 the friction clutch members 292 and 294 cooperate to rotate the ratchet, but on the return movement of rod 340 pawl 330 is moved into the position shown in Figure 14 of the drawings while pawl 332 engages a succeeding tooth on the ratchet. In this manner the spacing ratchet 277 will escape one tooth for each cycle of movement of the printing bail 128. Thus, the rack 346 (Figure 6) and the carriage 105 to which it is attached will assume positions corresponding to movements of the spacing ratchet 277 and carriage drive gear 276 which is in constant engagement with the teeth of rack 346.

The carriage 105 may be advanced without printing a character so as to leave a space on the copy. This is one of the functions of the printer and occurs when the spacing code signal is received in the selector mechanism which controls the rotation of square shaft 90 to position one of the arms 150 or 152 (Figure 8) of the function spider 148 opposite the space function push bar 191. When the spider 148 hits the end of bar 191 the lever 347 associated with it will pivot on the stud 348 and, by means of a linkage which is not shown, move a rod 348 (Figure 14) in the direction shown by the arrow to pivot pawl 332 and release the end 338 from the ratchet 277 whereupon the power means, as above explained, will advance the carriage 105 one space.

The drawings show a preferred embodiment of my invention in which a type bar carriage or basket 105 is mounted in a machine frame for horizontal movement as by means of the angularly related rollers 106 and roller 107 in supporting contact with the rails 102 and 104. However, in certain types of recording or printing machines the type bars remain stationary while the platen is arranged for horizontal movement relative to said type bars, and it is to be understood that the novel features of the present invention are applicable as well to this type of printing or recording machine.

When a "carriage return" signal is received the spider 148 pushes the function push rod 190 (Figure 8) which is associated with carriage return lever 350 which pivots at 352 and moves link 354 (Figure 13) which in turn moves latch 325 on its pivot whereby the latch is disengaged from arm 319 of the rock shaft 318, thus permitting spring 322 to disengage clutch collar 285 from member 286 whereby the power drive is disconnected from the character spacing means. It is to be noted that the adjustment of the safety clutch friction members 292 and 294 is such that slippage will occur when the carriers 105 is in its extreme operated position at the end of the line even though the pawls 330 and 332 are disengaged from the teeth of ratchet 277 by the operation of printing bail 128. This effectively prevents the machine from being damaged if the "carriage return" signal is not received.

As the shaft 318 (Figure 13) rocks under the influence of spring 322 clutch collar 314 moves to engage clutch member 315 and thereby operatively connect the power driven shaft 172 through worm 177 and gear 316 to gear 300, gear 279 and shaft 272, to rotate carriage drive gear 276 in a clockwise direction to move rack 346 and the carriage 105 to the left (Figure 1) towards its starting position. The friction means 302 and 304 between the sleeve 299 and gear 300 is so adjusted as to permit some slippage and thereby eliminate shock or jerk in starting the carriage 105 on its return movement. The major portion of this return movement is effected by the toothed engagement of gear 300 with gear 279. However, as the

carriage 105 nears its ultimate left hand or starting position, a roller 355 (Figure 14) on decelerating arm 280 will enter the slot 356 in a decelerating cam 357 secured to gear 300. At approximately the same time, the teeth of gear 300 move out of mesh with the teeth on gear 279 at one end of an untoothed or interrupted section 358 of gear 279 as seen in Figure 14. Continued rotation at a decelerated speed will then be transmitted to shaft 272 and gear 276 as roller 355 progressively moves inwardly in slot 356 towards the axis of gear 300. This produces a variable leverage between cam 357 and arm 280 which changes rapidly as the roller 355 moves toward the axis of gear 300, as shown in Figure 14, thereby effectively decelerating or slowing the final return movement of the carriage 105 to its starting position and eliminating shock or jar. As the carriage 105 reaches its starting position the extension 329 strikes the upper end 328 (Figure 13) of extension 327 and rocks shaft 318 and arms 319 and 320 against the pull of spring 322 to disengage clutch members 314 and 315 and engage spacing clutch members 285 and 286. When clutch collar 314 is raised by the rocking of the arm 319 the latch 325 is spring pressed under the arm to retain the clutch members in the position shown in Figure 13.

As mentioned above whenever the spider legs 150 or 152 (Figure 1) operate a function push rod the print block lever 166 (Figures 1 and 8) moves in front of the lever 168 and prevents it from operating. A pin 359 (Figure 8) integral with the frame member 98 is provided to keep the print block lever 166 from being pushed out of alignment by lever 168 when lever 166 is in its blocking position. If the spider legs do not engage one of the function push bars the notch 167 in the blocking lever 166 will be aligned with lever 168 and a printing operation will take place in the following manner.

A printing cam 360 (Figures 1 and 8) is rigidly secured to the power shaft 165 and rotates therewith. A cam roller 362 rides on the face of cam 360 and is affixed to printing lever 364 which is integrally formed with lever 168 and pivoted at 365 (Figure 8). At the end 365 of printing lever 364 a link bar 367 is pivoted to form a connecting link to a lever 368. The lever 368 is secured to printing shaft 129 so that it will rotate the shaft 129 a small amount and move the printing bail 128 through an arc to operate the selected type bar and cause a character to be printed. A spring 370 is fastened between an adjusting bar 371 and one end of lever 364 and forces the cam roller 362 to follow the edge of printing cam 360. Bar 371 is provided with a plurality of holes as shown so that the printing spring tension may be adjusted by supporting the bar in the desired position on a pin 372 secured in the frame 98.

As the power shaft 165 and printing cam 360 revolve, the cam roller 362 drops into the lowest point of the cam 360. The spring 370 causes a snap action which pivots the lever 364 about point 365 to raise link 367 which rocks lever 368 and printing shaft 129 to move printing bail 128 to the left (Figure 8). Bail 128 strikes the plunger or shaft 124 which supports the operating spider 95 and moves it to the right as seen in Figure 6 to operate the selected type bar 135. As the cam roller 362 again rides on the high portion 373 movement in the reverse direction takes place. As viewed in Figure 6 the shaft 129 will move in a counter-clockwise direction to move printing bail 128 to the left. Plunger 124 will move to the left under the impetus of spring 126 to disengage the spider 95 from the last previously operated type push bar.

An inking ribbon 374 (Figure 1) is threaded through the slotted ears 375 of a vibrating support 376 and is wound on spools 377 and 378 in a manner common in typewriters. Any suitable means common in the art may be used for feeding and reversing the inking ribbon 374. When the plunger 124 (Figure 6) is moved forward to operate a type bar it engages a sliding member 379 which through a bell crank 380 raises the ribbon vibrator 376 to place the ribbon 374 in the printing position. After the printing is completed the vibrator 376 returns to its "down" position so that the printed record is visible to the operator.

From the foregoing disclosure it will be apparent that the invention embodied herein provides a novel telegraph printer comprising a greatly improved arrangement of elements, and enabling more reliable operation than has heretofore been possible. The power drive of the carriage both in the character spacing and return directions allows positive operation of the machine in any position so that it may be used successfully in any type of moving vehicle. The separation of the function selection means from the type carriage has enabled the use of a considerably lighter and more mobile carriage and an improved carriage mount. At the same time, the double armed printing and function spiders and improved operation thereof allow faster and more reliable type bar or function selection and actuation. In addition, a novel range adjusting or orientation means is provided which allows adjustment between the stop cam and operating cams while the machine is in operation to compensate for changing line conditions.

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

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

1. In a telegraph receiver: a signal receiving magnet; selecting means positioned in accordance with signals received by said magnet; a movable type bar carriage having a slotted segment immovably fixed relative to and carried by the movable carriage and a group of individually selectable type bars pivotally mounted therein for printing characters at a position fixed relative to the carriage and common to all said type bars; and means, including an operating spider, carried by said carriage and positioned by the selecting means whereby said spider can individually select any predetermined type bar.

2. In a telegraph receiver including a typewriter: a signal receiving magnet; selecting means positioned under control of said magnet in accordance with received signals; a movable carriage having a slotted segment immovably fixed relative to said carriage, a group of type bars carried by said slotted segment; and rotatable means, including a rotatable positioning finger and a rotatable operating spider coaxial with said finger engaged, rotated and positioned by said finger, carried by said movable carriage and rotatably positioned by said selecting means to select a particular type bar.

3. In a telegraph receiver including a typewriter, a signal receiving magnet, selecting means positioned under control of said magnet in accordance with received signals, a movable carriage having a segment immovably fixed relative to said carriage, a group of type bars pivotally carried by said segment, a positioning finger and an operating spider, engaged and positioned by said positioning finger, both said positioning finger and said operating spider being disposed on and carried by said movable carriage and operably connected to said selecting means to selectively position said spider to select any particular one of the type bars in said group of type bars, and operating means for moving said spider to operate the selected type bar.

4. A telegraph receiver as defined in claim 3, wherein said operating means is a single bail extending the length of travel of said movable carriage.

5. In a telegraph receiver; type printing means comprising a movable type bar carriage, a plunger slidably

mounted in said carriage, and a type bar operating spider provided with two diametrically opposed arms attached to said plunger; a signal receiving magnet; means under the control of said signal receiving magnet to selectively position said operating spider in accordance with received signals; and means for moving said plunger axially to cause one or the other of the arms of said selectively positioned spider to operate a selected type bar to complete a printing operation.

6. In a telegraph receiver; a type bar printing mechanism comprising a carriage movable across a page for printing thereon, a group of type bars operatively mounted in said carriage, a group of push bars individually connected to said type bars, and a rotatable spider mounted on said carriage and provided with two diametrically opposed arms; means for selectively positioning said spider within an arc of 180° opposite any one of said push bars; and means to move said spider into engagement with the selected push bar, whereby said push bar and the type bar connected thereto are actuated to complete the printing operation.

7. A printing telegraph as defined in claim 6, wherein said type bar printing mechanism includes an ink ribbon and a ribbon vibrator means engaged with said ink ribbon, for moving said ribbon into position for printing, disposed in a position to be engaged and actuated by said plunger each time said plunger is moved axially.

8. In a printing telegraph, a movable type bar carriage, a rotatable positioning shaft, a positioning finger rotatably mounted on said movable carriage and slidably geared to said positioning shaft for longitudinal movement relative thereto, a rotatable spider mounted on said carriage to coact with said positioning finger, and means to selectively position said shaft and said finger geared thereto, whereby said spider is positioned for selection of a particular carriage type bar.

9. A printing telegraph as defined in claim 8, wherein said positioning shaft has a square cross-section.

10. A printing telegraph as defined in claim 8, wherein said positioning finger is slidably geared to said positioning shaft by means of a helical gear operably connected to said positioning finger and a matching gear slidably mounted on said positioning shaft.

11. In a telegraph receiver including a typewriter, a stop wheel assembly, a signal receiving magnet adapted to position said stop wheel assembly in accordance with the character of the received signals, a unidirectionally rotatable member operatively connected to said stop wheel assembly, a movable carriage, type bars carried by said carriage, a positioning finger carried on said carriage and rotated by said rotatable member, and a spider carried by said carriage and adapted to be rotated by said positioning finger to select a type bar in accordance with the setting of said stop wheel assembly.

12. In a printing telegraph receiver, signal receiving means, a group of type bars, a rotatable positioning finger, a rotatable operating spider associated with said finger, means controlled by said signal receiving means to rotatably position said positioning finger and said spider in accordance with the nature of a combinational group of the received signals to select any particular one of said type bars in said group of type bars, and means to actuate said spider to operate the particular type bar selected.

13. In a printing telegraph, a signal receiving magnet; a positioning shaft; a positioning finger rotatably positioned by said positioning shaft; a type bar operating spider adapted to engage said finger and be rotatably positioned thereby; latching means for normally securing said spider to said finger; means to selectively position said shaft finger and spider in accordance with the character of the signals received by said magnet, and means to dissociate said spider from said finger to thereby permit said finger to rotate independently thereof.

14. In a printing telegraph, a rotatable positioning finger, means including a signal receiving magnet to selectively position said positioning finger in any one of a plurality of positions in accordance with the nature of a combinational group of received signals, a rotatable type bar operating spider normally engaged and rotated with said positioning finger to be positioned thereby, means adapted to disengage said spider from said positioning finger to allow said finger to rotate independently and further means to rotate said spider independently to reengage said spider with said finger.

15. A printing telegraph as defined in claim 14, wherein said rotatable positioning finger is unidirectionally rotated in a circular path; said rotatable operating spider is axially shiftable, mounted coaxial with said rotatable finger, has at least one arm normally disposed in the circular path of said finger and is movable out of said path upon axial shifting; and said further means is resilient and torsionally and tensionally connects said finger to said spider.

16. In a telegraph receiver, type printing means comprising: a carriage provided with type bars and movable across a page for printing thereon; means for selectively operating said type bars including a plunger axially reciprocably supported by said carriage and a rotatable member coaxial with and coacting with said plunger and also supported by said carriage, said member being rotatable to selected type bar operating positions and axially reciprocable with said plunger to operate a selected type bar, and further means to axially conjointly move said plunger and said member along their axes to complete the printing operation, said axial movement being distinct from carriage movement.

17. In a telegraph receiver, a group of selector levers, a signal receiving magnet, an armature controlled by said magnet and arranged to engage a selector lever in one position of the armature and clear the lever in another position of the armature, a group of selector cams to operate said levers in succession and cooperate with said armature to mechanically position said levers in accordance with the received signals, a movable type bar carriage having a slotted segment rigidly fixed relative to said carriage and a group of type bars pivotally mounted therein for printing characters at a point fixed relative to the carriage and common to all type bars, a rotatable type bar operating spider mounted on said carriage, means controlled by said positioned selector levers to position said spider for operation of any particular one of said type bars by said spider, and an operating bail for moving said spider to operate a selected type bar.

18. A telegraph receiver as defined in claim 17, wherein said selector levers and said armature are formed so that they will lock together when in engagement.

19. In a printing telegraph, a signal receiving magnet, a movable carriage having a plurality of type bars, a rotatable type bar operating spider mounted on said carriage, means to selectively rotate said spider to a position adjacent any particular one of said plurality of type bars in accordance with the character of received signals, a printing bail for imparting operative movement to said spider to operate said type bar in a recording operation, and means alternatively connectable to a power source for normally moving said carriage one character space for each recording operation and for returning said carriage to its starting position.

20. In a printing telegraph, the combination set forth in claim 19 wherein said alternatively connectable means includes means for automatically decelerating movement of the carriage in its approach to starting position.

21. In a telegraph receiver including a typewriter, positioning means, a signal receiving magnet, means under the control of said magnet to position said positioning means in accordance with received signals, a movable carriage, a group of type bars carried by said carriage, a positioning finger carried by said carriage and connected to said positioning means, a type bar operating spider selectively positioned by said positioning finger and said positioning means to select any particular one

of said group of type bars, an operating bail for moving said spider to operate the selected type bar in a recording operation, and means alternatively connectable to a power source for normally moving said carriage one character space for each recording operation and for returning the carriage to its starting position.

22. In a recording apparatus, a type printing mechanism for recording the successive lines of characters on a page, a movable carriage to support said type printing mechanism, two spaced rotatable members, one of which is drive connected to said carriage, means for alternatively connecting one or the other of said two members to a power source for normally moving said carriage one character space for each recording operation and for returning the carriage to its start-of-line position, and means constantly drive coupling one of said two members to the other of said two members including automatic means for decelerating movement of the carriage only during its final approach to start-of-line position.

23. In a recording apparatus, a type printing mechanism for recording successive lines of characters on a page, a movable carriage to support said type printing mechanism, and means alternatively connectable to a power source for moving said carriage one carriage space for each recording operation and for returning the carriage to its start-of-line position, said means including driving and driven members and coacting variable leverage elements carried by said members said variable leverage elements being effective to decelerate movement of the driven member relative to the driving member only during the final approach of the carriage to its start-of-line position and being ineffective to decelerate movement during carriage spacing.

24. In a printing telegraph, a plurality of carriage support members, a recording type bar carriage, at least two relatively angularly displaced rollers on said carriage in engagement with one of said support members to movably support said carriage, and means alternatively connectable to a power source for normally moving said carriage one character space for each recording operation and for returning the carriage to its starting position.

25. In a printing telegraph, a machine frame; a type bar carriage; a plurality of carriage support members fixed in said frame, and a plurality of opposed pairs of rollers journalled on said carriage to rotate about an axis fixed relative to said carriage and each pair in rolling engagement with one of said support members to movably support said carriage, the spacing between the tops of the rollers of said pairs being greater than the spacing between the bottoms thereof to prevent displacement of said carriage transversely of its direction of movement along said support members.

26. In a printing telegraph receiver, signal receiving means; a group of type bars; a rotatable positioning finger having angular positions corresponding to each type bar and positioned under control by said signal receiving means in accordance with the received signals to select a particular type bar; a group of function operating members; and a rotatable function selecting finger connected to rotate and be positioned simultaneously with said rotatable positioning finger by said receiving means to select and operate a particular function operating member.

27. A printing telegraph receiver as defined in claim 26, wherein said positioning finger and said selecting finger are directly and simultaneously positioned by a square positioning shaft, said shaft being operably connected to said signal receiving means.

28. In a printing telegraph, signal receiving means a group of type bars; a rotatable positioning finger having an angular position corresponding to each type bar for selecting any particular one of said type bars; a group of function operating members; a rotatable function selecting finger having angular positions directly related to the angular positions of said positioning finger for selecting and operating a particular function operating member, a rotatable member operatively connected between said two fingers and controlled by said signal receiving means to simultaneously position the two fingers in an angular position corresponding to the received signals; and means structurally related to said function selecting finger to prevent actuation of a type bar when a function member is actuated.

29. In a printing telegraph receiver, signal receiving means; a group of type bars; a rotatable positioning finger having an angular position corresponding to each type bar for selecting any particular one of said type bars; a group of function operating members; a rotatable function selecting finger having angular positions directly related to the angular positions of said positioning finger for operating and selecting a particular function operating member; means operatively connected between said two fingers and controlled by said signal receiving means to position the two fingers in angular positions corresponding to received signals; and means for normally blocking certain of the selected function operating members to prevent their operation by said function selecting finger.

30. In a printing telegraph receiver, signal receiving means, a group of type bars, a positioning finger, selecting means controlled by said signal receiving means to position said positioning finger in accordance with the received signals to select a particular type bar, a group of function operating members, a selecting finger controlled simultaneously by said selecting means to select and operate a particular function operating member, a rotatable blocking ring structurally cooperating with said function operating means and normally positioned to block certain of said selected function operating members from operation by said selecting finger, and means for rotatably shifting said blocking ring to permit said selecting finger to operate said selected function operating members.

31. In a printing telegraph receiver, signal receiving means, a group of function bars, a rotatable function selecting finger, a rotatable operating spider associated with said finger, means controlled by said signal receiving means to rotatably position said finger and said spider in accordance with the nature of a combinational group of the received signals to select any particular one of said function bars in said group of function bars, and means to actuate said spider to operate the particular function bar selected.

32. In a printing telegraph receiver, signal receiving means, a group of function bars, a rotatable selecting finger, a rotatable operating spider coaxially associated with said finger to be engaged, rotated and positioned by said finger, means controlled by said signal receiving means to position and operate said finger and spider in accordance with the nature of a combinational group of the received signals to select and operate a particular function bar, a function operating member, a power member, means associated with said operated function bar to cause the engagement of said function operating member with said power member for operating a selected function requiring power for its operation.

33. In a printing telegraph receiver, a function selecting and operating spider, means to rotate and position said spider in accordance with received signal combinations, means to operate said spider axially when it is in a selected position, a receiver control linkage operable upon axial displacement of said spider to effect operation of a function of the receiver, and electrical contact means operated by said spider when it is moved axially.

34. A printing telegraph receiver including a function selecting and operating spider, means to rotate and position said spider in accordance with received signal combinations, means to operate said spider axially when it is in the selected position, and a receiver control linkage operable upon axial displacement of said spider to operate a function of the receiver.

35. In a telegraph receiver: a type bar printing mech-

anism comprising a carriage movable across a page for printing thereon, a group of type bars operatively mounted in said carriage, a group of operating means corresponding to and individually connected to said type bars, a rotatable spider mounted on said carriage; means for selectively positioning said spider within an arc opposite any one of said operating means; and means to move said spider into engagement with the selected operating means whereby said operating means and the type bar connected thereto are actuated to complete the printing operation.

36. A printing telegraph receiver comprising a selector mechanism to receive and convert permutated groups of electrical impulses into mechanical movement, recording means including a movable type bar carriage carrying a plurality of type bars, a rotatable type bar selecting finger carried by said movable carriage, a rotatable shaft selectively positioned by said selector mechanism, a drive gear connection between said finger and said shaft to position said finger for selection of a type bar, and means to maintain said drive gear connection in fixed relation throughout the movement of said carriage.

37. A printing telegraph receiver as defined in claim 36, wherein support means coact with said drive gear connection to support the rear of said movable carriage.

38. In a printing telegraph receiver, a selector mechanism to receive and convert permutated groups of electrical signals into mechanical movement, a rotatable shaft selectively positioned by said selector mechanism, a carriage support bar, a type bar carriage carrying a plurality of type bars, means supporting said type bar carriage for reciprocable movement on said rotatable shaft and said support bar, and type bar selecting means on said carriage positioned by said rotatable shaft to select a type bar in accordance with signals received as said carriage reciprocates on said shaft and bar.

39. A printing telegraph receiver as defined in claim 38, wherein said carriage is supported on said rotatable shaft by means of a support member on said carriage coacting with a bearing member slidable on said shaft.

40. A printing telegraph receiver as defined in claim 39 wherein said bearing member is geared to said type bar selecting means.

41. In a printing telegraph receiver, a stationary selector mechanism adapted to receive and convert permutative groups of electrical signals into mechanical movement, a rotatable shaft selectively positioned by said selector mechanism, a carriage support bar, recording means including a stationary page supporting platen and a type bar carriage carrying a plurality of type bars, means supporting said type bar carriage for reciprocable movement on said support bar and said rotatable shaft, means on said carriage coacting with said rotatable shaft to select a particular type bar corresponding to a received group of signals, and means to actuate the selected bar to print a character on the page of said platen.

42. A printing telegraph receiver comprising: type printing means including a movable type bar carriage carrying a plurality of type bars, an ink ribbon, a plunger slidably mounted in said carriage, and a type bar operating spider, provided with at least one side arm, attached to said plunger; a signal receiving magnet; means under the control of said signal receiving magnet to selectively position said operating spider in accordance with received signals; means for moving said plunger axially with respect to its axis to cause said arm of said selectively positioned spider to operate a selected type bar to complete a printing operation; and ribbon vibrator means engaged with said ink ribbon, for moving said ribbon into position for printing by a type bar, disposed in a position to be engaged and actuated by said plunger each time said plunger is moved axially.

43. A printing telegraph as defined in claim 42, wherein said ribbon vibrator means comprises a resiliently biased reciprocable link guided for sliding movement on said movable type bar carriage in alignment with said slidably mounted plunger and disposed with one end in a position to be engaged and moved against the bias force by said plunger.

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