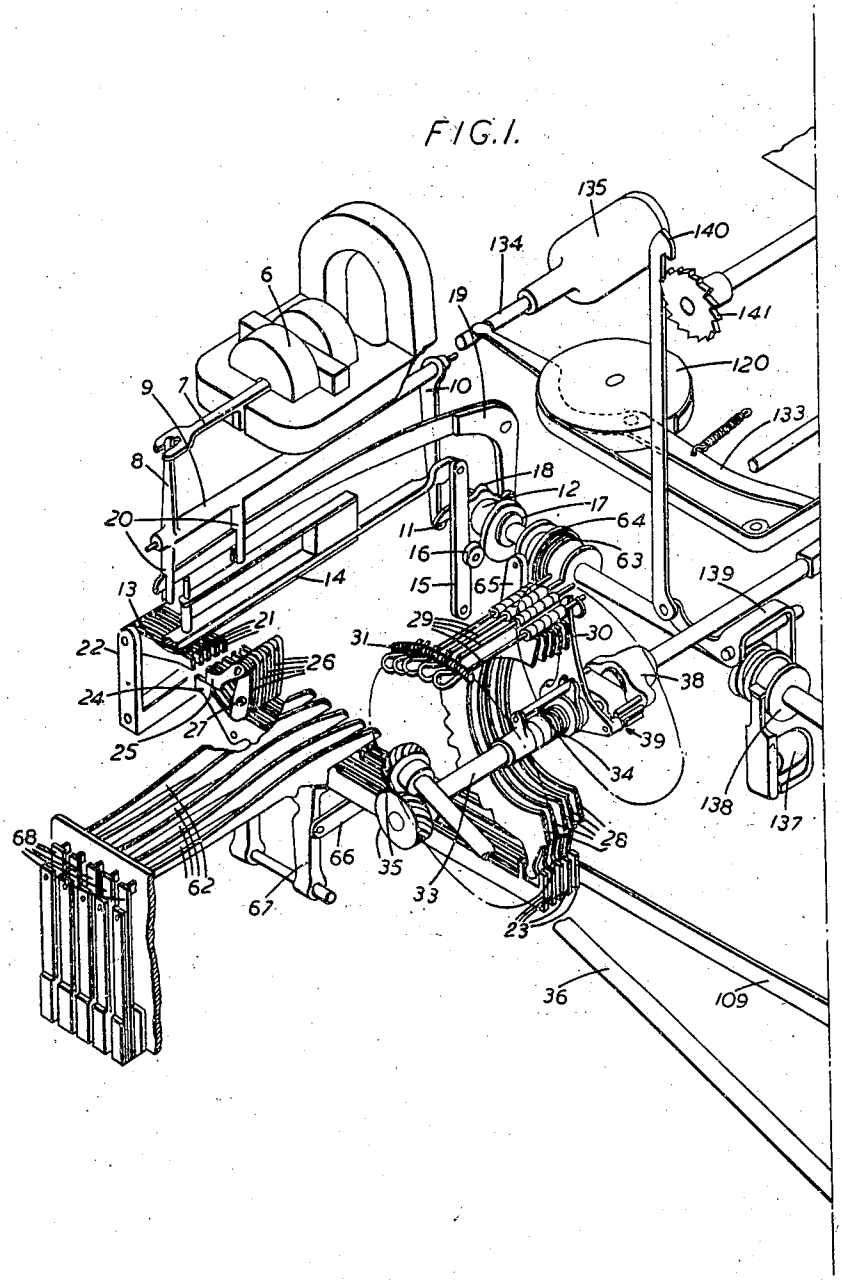
Feb. 22, 1949. R. D. SALMON 2,462,132

TYPEWHEEL POSITIONING MECHANISM FOR PRINTING TELEGRAPH APPARATUS

Filed Jan. 11, 1945 4 Sheets-Sheet 1

FIG. 1.



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TYPEWHEEL POSITIONING MECHANISM FOR PRINTING TELEGRAPH APPARATUS

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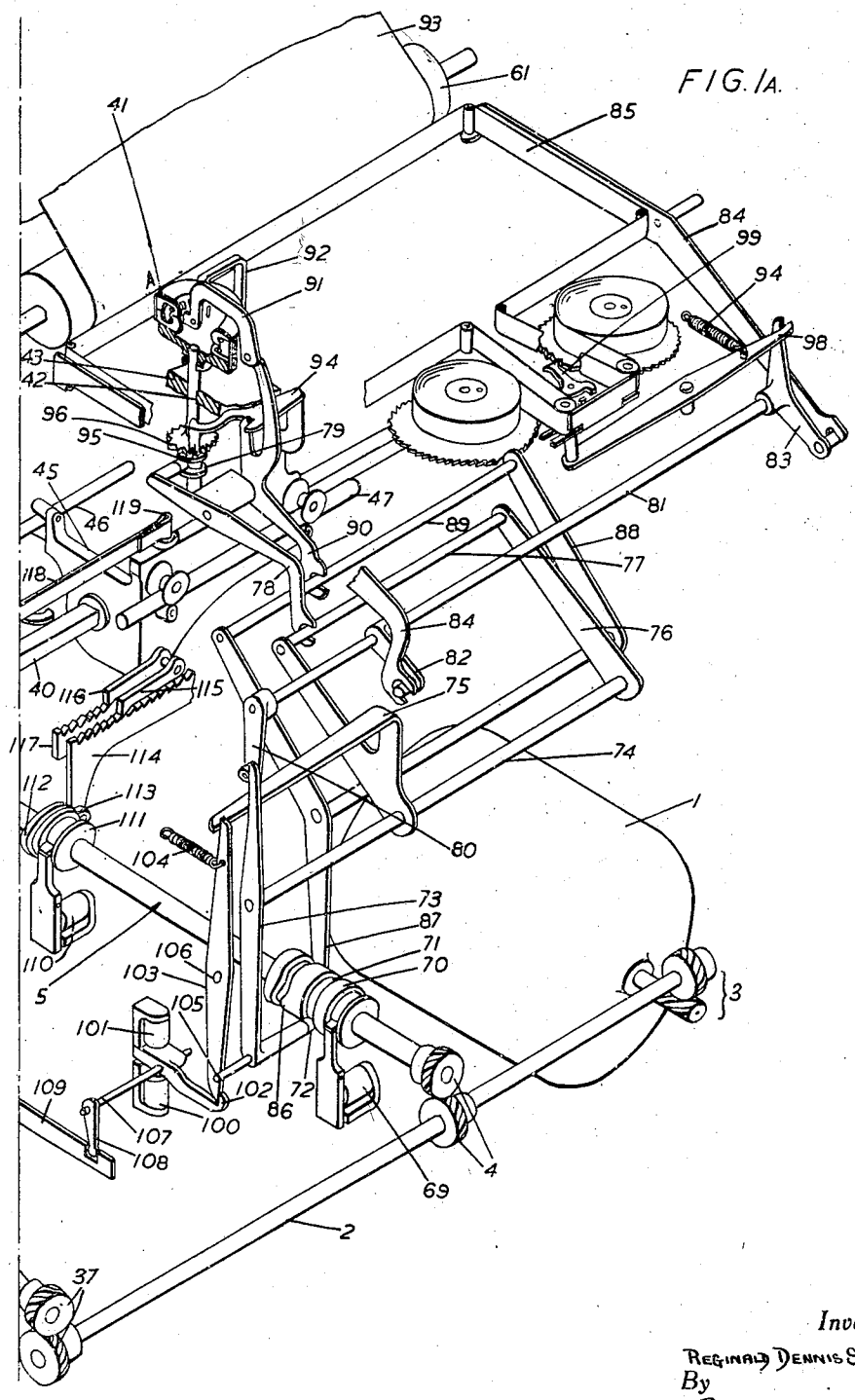
FIG. 1A.



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TYPEWHEEL POSITIONING MECHANISM FOR PRINTING TELEGRAPH APPARATUS

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FIG.2.

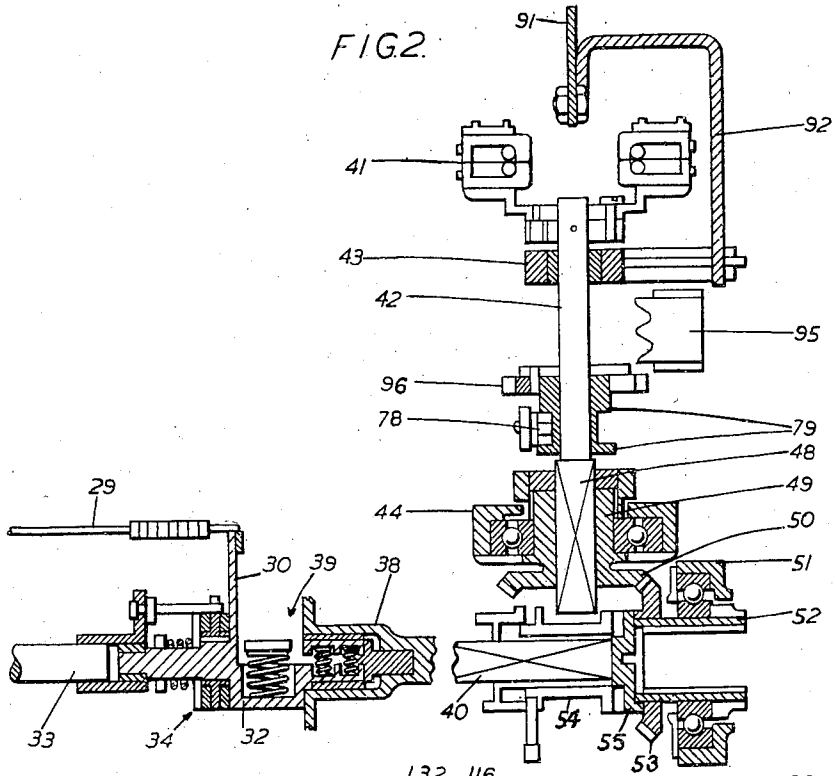


FIG.3.

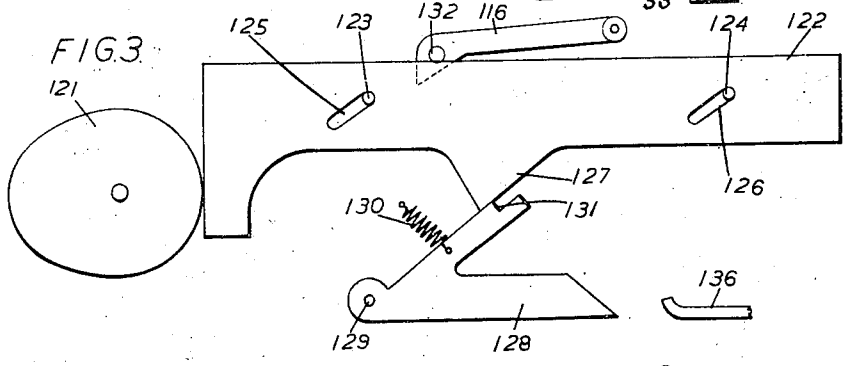
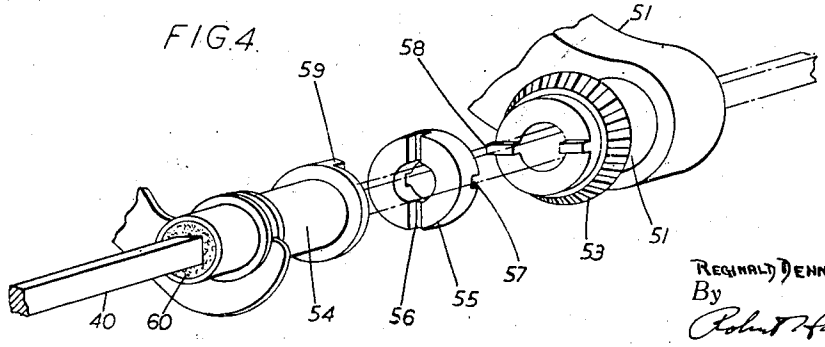


FIG.4.



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TYPEWHEEL POSITIONING MECHANISM FOR PRINTING TELEGRAPH APPARATUS

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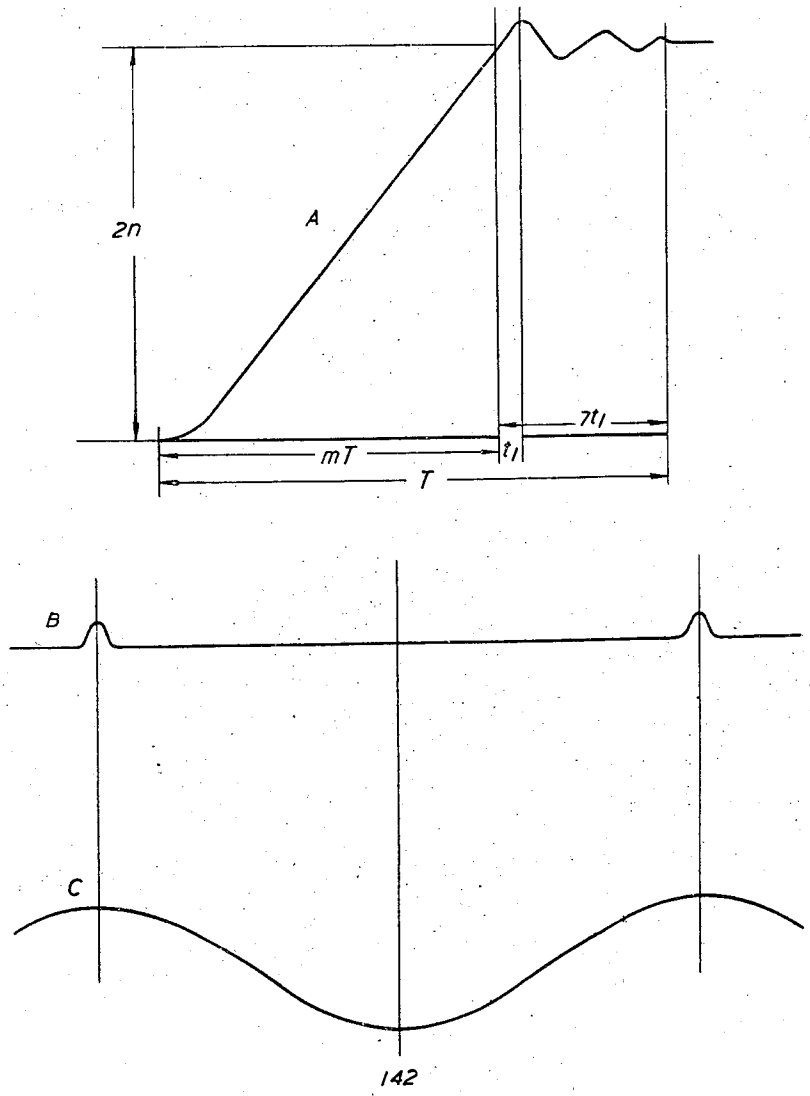
FIG.5.



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Patented Feb. 22, 1949

2,462,132

UNITED STATES PATENT OFFICE

2,462,132

TYPE WHEEL POSITIONING MECHANISM FOR PRINTING TELEGRAPH APPARATUS

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Application January 11, 1945, Serial No. 572,344
In Great Britain January 15, 1944

15 Claims. (Cl. 197—53)

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This invention relates to printing telegraph receivers in which a type wheel is provided with a plurality of rows of type normally out of printing position and means effective for every operation of printing from any of said rows for bringing the selected row into and out of printing position.

Such a printing telegraph receiver is described and claimed in British Patent No. 524,342. Primarily that patent claims a printing telegraph receiver comprising a typewheel normally located in such position that the line on the paper upon which printing is to take place is visible and the type wheel is moved into printing position to print on said line and again out of such position for each printing operation. As in the machine described in that patent the type wheel is furnished with two rows of type some means is necessary to bring the selected row of type into and out of printing position. This is effected in the machine described by giving to a lever for raising the typewheel an amount of movement a little more than is necessary to move the lower row of type into printing position. The type wheel shaft is then arrested in its movement by one of two abutments selected according to whether the upper or lower row of type is to be selected for printing. By such an arrangement the type wheel shaft is subjected to shocks at each movement.

It is the principal object of the present invention to provide a printing telegraph receiver of the kind specified above in which shock to any of the parts concerned in the movement of the typewheel is substantially eliminated.

According to one feature of the present invention a printing telegraph receiver comprises a typewheel provided with a plurality of rows of type normally out of printing position and means effective for every operation of printing from any of said rows for bringing the selected row into and out of printing position in a motion which approximates to simple harmonic motion, whereby shock is substantially eliminated.

According to another feature of the invention a printing telegraph receiver comprises a type wheel having the type thereon arranged in a plurality of rows, a plurality of levers corresponding respectively to the rows of type, each having a different ratio, means for selectively rendering one of said levers effective to move said type wheel, and means for actuating the selected lever to bring the corresponding row of type into printing position and to return the typewheel

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into a position to leave the printed character visible.

In the apparatus described in the above mentioned British Patent No. 524,342 the type wheel is mounted in a stationary framework and the platen carrying the paper is traversed for the printing of successive characters.

It is a further object of the present invention to provide a page printing telegraph receiver having a typewheel provided with a plurality of rows of type and means for bringing a selected one of said rows into printing position and out of printing position to leave the printed character visible, in which the type wheel is mounted on a carriage which is traversable, for letter spacing parallel to a platen mounted for rotation in a fixed framework. In fulfilling this object the embodiment of the invention to be described employs the invention claimed in U. S Patent No. 2,308,306, viz: a page printing telegraph receiver comprising a typewheel having its axis substantially at right angles to the axis of the platen, and having the type elements arranged in a plurality of rings, in which the type wheel is rotatable to select a type element within a ring of elements, movable axially to select one of said rings and traversable parallel to the axis of the platen for letter spacing and means is provided for moving a selected individual type element radially of the type wheel to effect printing.

In the embodiment of the invention described below the type wheel is rotated by means of a spline shaft along which the movable carriage is traversed. This method of rotating the typewheel has considerable advantages from the point of view of simplicity and also as enabling almost any desired form of translation of the received signal elements into a selective positioning of the typewheel to be used but it unfortunately presents manufacturing difficulties which it is believed have not hitherto been overcome in practice. These difficulties arise from the fact that it is impossible to manufacture a perfectly straight spline shaft. These difficulties have, however, been overcome by providing a self aligning coupling between a member keyed to the spline shaft and a member freely rotatable about the spline shaft.

A page printing telegraph receiver embodying the invention will be described in conjunction with the accompanying drawings in which:

Fig. 1 is an exploded perspective view of the machine, the framework upon which it is mounted and some details being omitted for the

sake of clearness. A few parts are shown in section.

Fig. 2 is a sectional view of the driving means for the typewheel.

Fig. 3 is a detail, omitted from Fig. 1 for the sake of clearness, showing the carriage return mechanism.

Fig. 4 is an exploded view of a self aligning coupling used in the driving means for the type wheel.

Fig. 5 shows curves for explaining the shift movement of the typewheel and its timed relation to the printing action and the selective rotation of the typewheel.

Referring to the drawings, Fig. 1 shows an exploded perspective view of a page printing telegraph receiver employing a typewheel mounted on a movable carriage. The framework upon which the parts are mounted has been omitted in order not to obscure any parts of the mechanism; this framework and the manner in which the mechanism is mounted therein are of well known construction and form no part of the present invention.

An electric motor 1 drives a main shaft 2 through gearing 3. The shaft 2 drives through gearing 4 a shaft 5 from which various cam sleeves are driven through one-revolution clutches as will presently appear.

The translating mechanism is similar to that described in U. S. Reissue Patent No. 17,725. An electromagnet 6 responds to the incoming signals and in response to the start element of a signal moves its armature 7 to the right in Fig. 1, thereby rotating lever 8 in a clockwise direction. Lever 8 is mounted on a rock shaft 9 carrying a detent lever 10. Rotation of detent lever 10 in a clockwise direction removes it from a detent 11 on a cam sleeve 12 tending to be driven through a clutch (not shown) from shaft 5, and cam sleeve 12 thus commences to rotate.

A striker pin 13 is carried on a link 14 pivoted to a lever 15 carrying a cam follower 16 held by a spring (not shown) against a cam 17 on cam sleeve 12. A cam 18 also fixed on cam sleeve 12 reciprocates a striker lever 19 moving in guides 20 fixed to rock shaft 9. As the rock shaft 9 is rotated anti-lockwise or clockwise by armature 7 in accordance with the character of received signal elements the striker lever 19 engages striker pin 13 or is clear thereof. The striker pin 13 during the reception of a signal is being traversed over selector fingers 21 so that at the middle of the interval allotted to a signal element it is immediately over one of these fingers, of which there are five as shown in the case of a five unit code. Thus if during a signal element period the striker lever 19 engages the striker pin 13, a selector finger 21 is moved downwards. The selector fingers are mounted so that they are held by friction in the position into which they are moved. The mechanism thus described is that described in U. S. Reissue Patent No. 17,725, with the sole exception that the striker pin 13 is struck against selector fingers 21 in a vertical plane instead of a horizontal plane as in the above mentioned patent.

The selector fingers 21 are pivoted on a finger actuating lever 22 and after the selector fingers 19 have all been set in accordance with the elements of the received signal, a cam (not shown) on the cam sleeve 12 moves the lever 22 so as to cause the selector fingers 21 to be moved to the right in the drawing to act upon a set of members for determining the position of a typewheel.

In the mechanism described in the above mentioned patent the selector fingers when moved by their actuating lever are caused to act upon notched code discs. In order to separate the type wheel positioning mechanism from the function mechanism, the selector fingers 21 are caused to set corresponding code bars 23, which code bars act to position notched code discs and also to select the functions to be performed. Furthermore the code bars 23 remain in the positions into which they are actuated by the selector fingers 21 instead of being returned into initial position by springs as are the code discs described in the above mentioned patent.

It a selector finger 21 has been moved downwards by the striker pin 13 it is opposite the end 24 of its corresponding code bar 23. If a selector finger 21 has not been moved by the striker pin 13 it is opposite the end of a corresponding member 25. Members 25 are pivotally mounted on one end of corresponding levers 26 pivoted at 27, the other ends of which are pivotally attached to code bars 23. If a selector finger 21 is opposite the end 24 of its corresponding code bar 23 when moved to the right, the corresponding code bar 23, if in its leftward position, will be moved to the right. The corresponding lever 26 will be rotated anti-clockwise and will bring corresponding member 25 into position to be struck by a selector finger 21 if the latter be in the upper position when subsequently moved to the right. If a selector finger 21 when moved to the right is opposite a member 25 and the corresponding code bar 23 is in its rightward position, finger 21 will strike member 25, lever 26 will be rotated clockwise and code bar 23 moved to the left. It will be seen that if a code bar is already in the position into which it is to be moved, the end 24 of the code bar or the member 25 as the case may be will be to the right and a sufficient distance to ensure that the selector finger 21 does not come into contact therewith.

The code bars 23 are held in either of the two positions into which they are actuated, by means for example of jockey springs (not shown).

Linked to each code bar 23 is a notched combination disc 28. There are thus five notched code discs 28 and these are arranged in relation to stop members 29 placed around their periphery and a stop arm 30 in the manner described in the above mentioned Reissue Patent No. 17,725. The stop members 29 are urged towards the centre of the discs 28 by means of a spring 31 and a given setting of the discs allows one of the stop members 29 to be moved into the path of the stop arm 30, which is fixed to a short shaft 32 (Fig. 2). The shaft 32 is driven from a shaft 33 through a clutch 34. The shaft 33 is driven through gears 35 from a shaft 36 which in turn is driven from shaft 2 through gears 37. The shaft 32 is connected to a hub 38 through a shock absorbing coupling 39 which is described and claimed in United States Patent No. 2,382,668 issued August 14, 1945. The clutch 34 is also described in that patent.

When the code bars 23 and thus the code discs 28 are reset in a fresh combination the stop member 29 that was resting in a series of aligned notches is forced out of those notches and accordingly out of the path of stop arm 30. The stop arm 30 and the hub 38 commence to rotate and continue to do so until the stop arm 30 engages another stop member 29 that has fallen into a new series of aligned notches in the discs 28.

The hub 38 is fixed to a spline shaft 40 through which it drives a typewheel 41. The typewheel

41 is fixed to a vertical spindle 42 (Fig. 2) mounted in bearings 43 and 44 in a carriage 45. The carriage 45 runs on guide rails 46, 47 (Fig. 1). Spindle 42 is provided at its lower end with a squared portion 48 (Fig. 2) which can slide within an internally squared sleeve 49 carrying a bevel gear 50. Also carried on carriage 45 is a bearing 51 within which is rotatably mounted a sleeve 52 coaxial with the spline shaft 40. Fixed to sleeve 52 is a bevel gear 53 meshing with bevel gear 50. Sleeve 52 is driven through a self aligning coupling from a sleeve 54 also mounted on carriage 45 and slideable along spline shaft 40 but keyed to the spline shaft 40. The self aligning coupling is shown exploded in Fig. 4 and comprises a thin sleeve 55 freely rotatable about shaft 40 and having formed on its opposite ends two key ways 56 and 57 at right angles to one another. A key 58 on sleeve 52 engages in key way 57 and a key 59 on sleeve 54 engages in key way 56. Sleeve 55 is of such thickness that keys 58 and 59 engage therewith in almost the same vertical plane. If sleeve 52 is out of alignment with sleeve 54 and/or sleeve 55 the keys 58, 59 still engage in slots 57 and 56 respectively and so transmit rotary motions. The interior of sleeve 54 is filled with lubricating material 60 to provide lubrication of the sliding motion along the spline shaft.

By means of the arrangements just described the type wheel 41 is rotatable to select a position of the type from which printing is to take place. The type elements on the typewheel are arranged in two rings and these type elements are mounted in the typewheel in such a manner as to be adapted to be struck radially from the typewheel to effect printing, the arrangement and mounting of the elements in the typewheel being the same as described in said British Patent No. 524,342. The carriage 45 is traversable parallel to a platen 61, and the typewheel is movable axially to bring one of the rings of type into printing position and to move a selected individual type element radially of the typewheel to effect printing in a manner now to be described.

The functions just referred to are controlled from the code bars 23 in the manner described and claimed in United States Patent No. 2,346,944. Lying across the code bars 23 are function selecting members 62. There is a member 62 for each function including printing, letter space, figure shift and carriage returns. Only some of the function selecting members 62 have been shown, and these only diagrammatically, but it is to be understood that these members are constructed in the same manner as the function selecting members described in U. S. Patent No. 2,346,944 and are arranged in relation to the code bars 23 in the same manner as the function selecting members are arranged in relation to the combination bars described in that patent.

After code bars 23 have been positioned, a cam (not shown) on cam sleeve 12 releases a cam sleeve 63 to be driven for one revolution by shaft 5. A cam 64 on cam sleeve 63, actuates a cam follower 65 to move, through a link 66, a bail 67, which as described in U. S. Patent No. 2,346,944 above referred to first allows one or more of the members 62 to be moved to the right by a spring and then moves to the left to move any selected function member to the left to initiate the performance of the selected function.

The function members 62 are shown in Fig. 1 as acting upon corresponding contact members 68 each of which when acted upon by its corresponding function member 62 causes the closure of a circuit to energize an electromagnet which thereupon releases a cam for rotation to perform the required function. It is to be understood, however, that selected function members 62 when moved to the left by bail 67 may release the corresponding cams for rotation through mechanical linkages.

The electromagnet 69 is the printing electromagnet and when operated releases a cam sleeve 70 for rotation through one revolution, the cam sleeve 70 being driven by shaft 5. The typewheel 41 is normally located below the line of printing and must therefore be raised into the line of printing before printing takes place. Cam sleeve 70 is formed with a grooved cam 71, the groove having the form of a sine curve, and through a cam follower 72 moving in this groove, acts upon a lever 73 pivoted on a rod 74 fixed in the framework (not shown). The other end of lever 73 acts upon an extension 75 of a frame 76 also pivoted on rod 74. The frame 76 carries a bail 77. The first movement of lever 73 is counterclockwise and thus bail 77 is moved counterclockwise. A lever 78 pivoted on carriage 45 is formed with one end forked and engaging bail 77 and is thus rotated clockwise. The other end of lever 78 engages between flanges 79 of a member fixed to the typewheel spindle 42 and as lever 78 is rotated clockwise the typewheel spindle is raised. At the same time lever 73 acts upon a lever 80 attached to a rockshaft 81. Fixed to the rockshaft 81 are levers 82 and 83 which engage the ends of a frame 84 carrying an ink ribbon 85. The ink ribbon 85 is thus raised with the typewheel 41. As the upper row of the typewheel reaches the line of printing a cam 86 on cam sleeve 70 acts on an extension 87 of a frame 88 carrying a printing bail 89. Printing bail 89 is engaged by the forked end of a printing lever 90 pivoted on carriage 45 and the printing lever 90 is rotated sharply in a counter clockwise direction to move a printing hammer 91, pivoted thereto. The printing hammer 91 is also pivoted to a lever 92 which is itself pivoted on the upper portion of the carriage 45. The printing hammer is thus guided to move a type element radially of the type wheel and so strike the ink ribbon 85 against a sheet of paper 93 on the platen 61.

Just before the printing hammer 91 strikes a type element, the movement of the printing lever 90 allows a corrector lever 94 pivoted on the carriage 45 to be moved by a spring (not shown) towards the typewheel spindle 42 in such manner that a corrector member 95 on the end of lever 94 engages between teeth of a corrector wheel 96 fixed to the spindle 42 of the typewheel.

As stated above the cam 71, which acts on lever 73 to move bail 77 to raise the typewheel into the line of printing, is sine shaped so that after printing has taken place the typewheel 41 is again lowered to allow the last printed character to be visible. At the same time also the lever 73 allows levers 82 and 83 to rotate clockwise under the influence of a spring 97 to lower the ink ribbon frame. Lever 83 is formed as a bell crank one arm of which is engaged by a lever 98 acted on by the spring 97. As lever 98 is reciprocated first in an anti-clockwise and then in a clockwise direction, it reciprocates a pawl 99 of an ink ribbon feeding and reversing mechanism constructed as described in U. S. Patent No. 2,090,811.

The letter shift and figure shift function members of members 62 operate the windings 100 and 101 of a polarised electromagnet, the armature 102 of which is formed with a hook at one end engaging a lever 103 when the armature is in the position shown, i. e. when winding 100 has been energised to move armature 102 into letter shift position.

In the letter shift position the upper row of characters on the type wheel is raised into printing position as was described above, lever 103 being held by the armature 102. When the function member 62 for figure shift is selected, winding 101 is energised and the armature 102 rotated in a clockwise direction to disengage it from lever 103.

Subsequently when lever 73 is moved by cam 71, lever 103 is caused by spring 104 to press against a pin 105 constituting an extension of cam follower 72 moved in a simple harmonic motion by cam 71. Lever 103 is pivoted at 106 so as to have a greater ratio than lever 73. Lever 103 acts on extension 75 of frame 76 and moves bail 77 to a greater extent than it is moved by lever 73 and the lower row of characters on the typewheel is raised into printing position. Armature 102 is fixed to a rock shaft 107 on which is fixed a lever 108 linked to a bar 109. The bar 109 extends alongside code bars 23 and forms a sixth code bar for determining the selection of such function members 62 as are only to be selected following the figure shift combination as described in U. S. Patent No. 2,346,944.

The letter spacing function member of the members 62 closes a contact to operate an electromagnet 110, which releases a cam sleeve 111 to be driven through a one revolution clutch from shaft 5. A cam 112 on the cam sleeve 111 acts on a cam follower 113 carried on a rack 114. The rack 114 is mounted for longitudinal movement and is reciprocated longitudinally by cam 112. A pawl 115 carried on the carriage 45 engages rack 114 so that movement of rack 114 to the right moves the pawl 115 to the right and with it the carriage 45. A pawl 116 also carried on carriage 45 engages teeth on a fixed rack 117. When the carriage 5 is moved to the right by rack 114, pawl 116 rides over a tooth on the rack 117 but when rack 114 is returned to the left the pawl 116 engages a tooth on the fixed rack 117 and prevents the carriage 45 being returned to the left.

A steel tape 118 is secured at one end to a post 119 on the carriage 45 and is wound round a spring drum 120 to which the other end is secured. Accordingly the carriage 45 is moved to the right against the force of the spring in the drum 120. The mechanism for returning the carriage to the left in Fig. 1 is not shown in that figure, but is shown in Fig. 3. The carriage return function member 62 closes a contact to operate a carriage return release magnet (not shown) which releases a cam 121 for one revolution. Cam 121 acts on a bar 122 which lies between the racks 114 and 117 (Fig. 1). The bar 122 is mounted on pins 123 and 124 which engage in inclined slots 125 and 126 in the bar. Accordingly as bar 122 is moved to the right by cam 121 it is raised so that a projection 127 on the underside of the bar rides over a latch 128 pivoted at 129 held by spring 130 against the projection 127. Bar 122 is raised until a shoulder 131 on latch 128 engages behind projection 127 and holds bar 122 in raised position. The pawls 115 and 116 carry pins 132 (Fig. 3) which engage

the upper surface of bar 122 so that when the bar 122 is raised pawls 115 and 116 are raised out of engagement with the racks 114 and 117 respectively. The steel tape 118 is thus enabled to draw the carriage 45 to the left in Fig. 1 under the influence of the spring in the drum 120. As the carriage 45 approaches the beginning-of-line position it strikes one end of a lever 133 (Fig. 1), the other end of which moves a plunger 134 in a dashpot 135 to cushion the movement of the carriage. As the carriage reaches beginning-of-line position a shoe 136 (Fig. 3) carried thereon engages the horizontal arm of lever 128 and rotates it clockwise, thus freeing shoulder 131 from the projection 127 on bar 122 and allowing bar 122 to return to normal position.

The line-feeding function bar 62 closes a contact to operate magnet 137 which releases a cam 138 for rotation by shaft 5. The cam 138 operates a lever 139 to which is linked a spring pawl 140 which acts on a ratchet wheel 141 to rotate the platen 61 for line feeding.

It will be clear from the preceding description that a signal combination received by the apparatus described results in the printing of a character whilst a succeeding signal combination is being received. During the receipt of a signal combination the selector fingers 21 are being set in accordance with the kinds of the succeeding signal elements. During the receipt of the stop elements the selector fingers 21 are moved to the right to set bars 23 and as selector fingers 21 are moved back to the left they are restored to normal position ready to be reset in accordance with the succeeding signal combination. Whilst this succeeding signal combination is being received, the rotary movement of the typewheel consequent upon the release of stop arm 30, when the combination discs 28 are moved by the code bars 23, takes place. The time allotted for rotation of the typewheel must be sufficient to allow for a complete rotation. Fig. 5 shows in curve A a graph of the motion of the typewheel and this curve A shows the motion of the typewheel through 2π radians in a fraction mT of the total time allotted to the rotary movement. As stated above, the typewheel is driven from shaft 33 through a clutch 34 and a shock absorbing coupling as described and claimed in said U. S. Patent No. 2,382 668 and the interval of time $7t$, out of the total interval T, is allowed for the energy of movement of the spline shaft 40 and the gearing connecting it with the typewheel. Curve C of Fig. 5 shows the shape of the cam 71 effecting the axial movement of the typewheel and is consequently a graph of the vertical movement of the typewheel. The point 142 represents the lowest and thus the normal position of the typewheel and the starting point of the vertical movement. It will be seen that the vertical movement may commence whilst the rotary movement of the typewheel is continuing but that the rotary movement has ceased before the typewheel has reached its highest point. Curve B of Fig. 5 represents the outline of the printing cam 86 and it will be seen that printing takes place when the typewheel has been raised to its highest point. Thereafter the downward movement of the typewheel to leave the printed character visible commences and the rotary movement of the typewheel in consequence of a new positioning of the combination discs 28 may commence whilst the typewheel is being lowered to normal position.

It will be seen that the upward and downward movements of the typewheel occupy a period

which is equal to the full period allowed for the selective rotary positioning of the typewheel and this combined with the simple harmonic motion in a vertical direction enables this motion to be carried out without shock. It should be noted that shock is liable to occur at the beginning and the end of this vertical motion so that it is important that the motion at these two points should be as nearly as possible simple harmonic but in the interval between need only approximate thereto. It will be clear also that the vertical movement of the typewheel is equally simple harmonic motion whether the typewheel is raised to enable printing to be effected from a type element in the upper or lower row of elements thereon, due to the fact that the difference of amplitude of motion is obtained by means of levers of two different ratios, but actuated by the same cam.

What is claimed is:

1. Page printing telegraph receiver comprising a platen, a spline shaft parallel to the axis of said platen, a carriage movable along said spline shaft, a typewheel mounted in said carriage with its axis substantially at right angles to the axis of said platen, a gear wheel mounted on said carriage so as to be freely rotatable about said spline shaft, a sleeve keyed to said spline shaft and movable with said carriage, a self aligning coupling connecting said gear wheel and said sleeve, gearing connecting said typewheel and said gear wheel, means for selectively rotating said spline shaft to select a type on said typewheel, means for printing from the selected type and means for traversing said movable carriage along said spline shaft for letter spacing.

2. Page printing telegraph receiver as claimed in claim 1 comprising means for axially moving said typewheel in an approximation to a simple harmonic motion into position to print on a line on said platen and out of position to leave the printed character visible.

3. Printing telegraph receiver comprising a typewheel having the type thereon arranged in a plurality of rows, means for rotating the typewheel selectively, means for selectively shifting said typewheel to bring a selected row of type into printing position including a plurality of levers of different ratios and operating connections from each of said levers for shifting said typewheel along its axis to an extent which varies according to whether one or the other of said levers is actuated, means for selectively actuating one of said levers to produce corresponding axial shifting of said typewheel, thereby bringing the corresponding row of type into printing position, and to return the typewheel into a position to leave the printed character visible, and means for printing from said typewheel when in printing position.

4. Printing telegraph receiver comprising a typewheel having the type thereon arranged in two rows, means for rotating the typewheel selectively, means including two levers of different ratios and operating connections from each of said levers for shifting said typewheel along its axis to an extent which varies according to whether one or the other of said levers is actuated, means for selectively actuating one of said levers to produce corresponding axial shifting of said typewheel, thereby bringing the corresponding row of type into printing position, and to return the typewheel to an extent sufficient to leave the printed character visible, a single cam for actuating both levers in an approximation to a simple harmonic motion, means effective for each character received for rotating said cam, means for selectively holding one of said levers against movement by said cam and means for printing from said typewheel when in printing position.

5. Page printing telegraph receiver comprising a platen, a spline shaft parallel to the axis of said platen, a carriage movable along said spline shaft, a typewheel having its axis substantially at right angles to the axis of said platen and having thereon a plurality of rows of type and mounted for axial movement in said carriage, a bail extending parallel to said platen and pivotally mounted for movement about an axis parallel to itself, a first lever pivoted on said carriage and slidably engaging said bail for moving said typewheel axially, a gear wheel mounted on said carriage so as to be freely rotatable about said spline shaft, a sleeve movable with said carriage and keyed to said spline shaft, a self-aligning coupling connecting said gear wheel and said sleeve, gearing connecting said typewheel and said gear wheel, means for selectively rotating said spline shaft to selectively rotate said typewheel, means for selectively shifting said type wheel to bring a selected row of type into printing position including a lever corresponding to each of the rows of type and each lever acting differently upon said bail, a single cam for moving said levers in an approximation to a simple harmonic motion during a complete rotation thereof, means for selectively rendering one of said levers effective when acted upon by said cam to move said bail to an extent sufficient to move the typewheel to bring the corresponding row of type into printing position and to return the typewheel to a position in which the printed character is visible, means effective upon the receipt of each character to cause a complete rotation of said cam, means for printing from said typewheel when the selected row of type is in printing position and means for traversing said carriage along said spline shaft for letter spacing.

6. Printing telegraph receiver comprising a typewheel, means for selectively rotating said typewheel, a lever for moving said typewheel axially into printing position to print on a line of type and out of such printing position to leave the printed character visible, a cam for actuating said lever in an approximation to a simple harmonic motion, a shaft upon which said cam is fixed in such position that when the shaft is stationary the said type wheel is out of printing position, means for starting the rotation of said shaft after the lapse of approximately half the interval allotted to a complete rotation of the typewheel after the commencement of such rotation, means for arresting said shaft in said first mentioned position, and means for printing from said typewheel when in printing position.

7. Printing telegraph receiver comprising a typewheel having the type thereon arranged in two rows, means for rotating the typewheel selectively, two levers having different effects and corresponding to the respective rows for moving the typewheel axially until the desired row is in printing position and returning the typewheel to an extent sufficient to leave the printed character visible, a cam, a cam follower attached to the lever of lesser effect, means for holding said cam follower in actuable relation to said cam, spring means for drawing the lever of greater effect into actuable relation to said cam follower, means for selectively retaining the lever of greater effect against actuation by said spring

means, means effective for each character received to rotate said cam and means for printing from a row of type on said typewheel when said row is in printing position.

8. Page printing telegraph receiver comprising a rotatable platen, a spline shaft parallel to the axis of said platen, a carriage movable along said spline shaft, a typewheel mounted in said carriage with its axis substantially at right angles to the axis of said platen, a gear wheel mounted on said carriage so as to be freely rotatable about said spline shaft, a sleeve keyed to said spline shaft and movable with said carriage, a narrow member slidable on said spline shaft located between said gear wheel and said sleeve and having slots in its opposite ends, the said slots being at right angles, keys on said gear wheel and said sleeve respectively engaging in respective slots, gearing connecting said typewheel and said gear wheel, means for selectively rotating said spline shaft to select a type on said typewheel, means for actuating the selected type for printing and means for traversing said movable carriage along said spline shaft for letter spacing.

9. Printing telegraph receiver comprising a type wheel having the type thereon arranged in two rows, and means for selectively moving said type wheel axially from a print-exposing position to a printing position for a selected row and returning the same including a member connected to said type wheel to impart corresponding movement thereto, a cam follower parallel to said member, means including a rotatable cam for actuating said cam follower, a lever having an arm connected to said cam follower to move therewith and an arm engaging said member to move the upper row of type to the printing line, a second lever having its fulcrum closer to the cam follower than that of the first lever and with one arm engaging said member and the other arm engaging said cam follower at one side to be returned thereby, and spring means acting on the second lever to move the type wheel and place the lower row of type in printing position, the return movement of the cam follower returning the second lever to normal position against the action of said spring means.

10. Page printing telegraph receiver comprising a platen, a shaft adjacent said platen, a carriage movable along said shaft, a typewheel having thereon a plurality of rows of type and mounted for axial movement in said carriage, a bail extending parallel to said platen and pivotally mounted for movement about an axis parallel to itself, a first lever pivoted on said carriage and slidably engaging said bail for moving said typewheel axially, a gear wheel mounted on said carriage so as to be freely rotatable about said shaft, a sleeve movable with said carriage and keyed to said shaft, means connecting said gear wheel and said sleeve, means connecting said typewheel and said gear wheel, means for selectively rotating said shaft to selectively rotate said typewheel, means for selectively shifting said typewheel to bring a selected row of type into printing position including a lever corresponding to each of the rows of type and each lever acting differently upon said bail, a single cam for moving said levers in an approximation to a simple harmonic motion during a complete rotation thereof, means for selectively rendering one of said levers effective when acted upon by said cam to move said bail to an extent sufficient to move the typewheel to bring the corresponding row of type into printing position and to return the typewheel to a position in which the printed character is visible, means effective upon the receipt of each character to cause a complete rotation of said cam, means for printing from said typewheel when the selected row of type is in printing position and means for traversing said carriage along said shaft for letter spacing.

11. Page printing telegraph receiver comprising a platen, a spline shaft parallel to the axis of said platen, a carriage movable along said spline shaft, a typewheel having its axis substantially at right angles to the axis of said platen and having thereon a plurality of rows of type and mounted for axial movement in said carriage, a bail piovtally mounted for movement about an axis parallel to itself, means engaging said bail for moving said typewheel axially, a gear wheel mounted on said carriage so as to be freely rotatable about said spline shaft, a sleeve movable with said carriage and keyed to said spline shaft, a self-aligning coupling connecting said gear wheel and said sleeve, gearing connecting said typewheel and said gear wheel, means for selectively rotating said spline shaft to selectively rotate said typewheel, means for selectively shifting said type wheel to bring a selected row of type into printing position including a lever corresponding to each of the rows of type and each lever acting differently upon said bail, a single cam for moving said levers in an approximation to a simple harmonic motion during a complete rotation thereof, means for selectively rendering one of said levers effective when acted upon by said cam to move said bail to an extent sufficient to move the typewheel to bring the corresponding row of type into printing position and to return the typewheel to a position in which the printed character is visible, means effective upon the receipt of each character to cause a complete rotation of said cam, means for printing from said typewheel when the selected row of type is in printing position and means for traversing said carriage along said spline shaft for letter spacing.

12. Page printing telegraph receiver comprising a platen, a spline shaft adjacent said platen, a carriage movable along said shaft, a typewheel having thereon a plurality of rows of type and mounted for axial movement in said carriage, a bail pivotally mounted for movement about an axis parallel to itself, means engaging said bail for moving said typewheel axially, a gear wheel mounted on said carriage so as to be freely rotatable about said shaft, a sleeve movable with said carriage and keyed to said shaft, means connecting said gear wheel and said sleeve, means connecting said typewheel and said gear wheel, means for selectively rotating said shaft to selectively rotate said typewheel, means for selectively shifting said typewheel to bring a selected row of type into printing position including a lever corresponding to each of the rows of type and each lever acting differently upon said bail, a single cam for moving said levers in an approximation to a simple harmonic motion during a complete rotation thereof, means for selectively rendering one of said levers effective when acted upon by said cam to move said bail to an extent sufficient to move the typewheel to bring the corresponding row of type into printing position and to return the typewheel to a position in which the printed character is visible, means effective upon the receipt of each character to cause a complete rotation of said cam, means for printing from said typewheel when the selected row of type is

in printing position and means for traversing said carriage along said shaft for letter spacing.

13. Printing telegraph receiver comprising a typewheel, means for selectively rotating said typewheel, a lever for moving said typewheel axially into printing position to print on a line of type and out of such printing position to leave the printed character visible, means for actuating said lever in an approximation to a simple harmonic motion, a shaft upon which said actuating means is fixed in such position that when the shaft is stationary the said typewheel is out of printing position, means for starting the rotation of said shaft after the lapse of approximately half the interval allotted to a complete rotation of the typewheel after the commencement of such rotation, means for arresting said shaft in said first mentioned position, and means for printing from said typewheel when in printing position.

14. Printing telegraph receiver comprising a typewheel having the type thereon arranged in two rows, means for rotating the typewheel selectively, means including a cam and two levers having different effects and corresponding to the respective rows for moving the typewheel different distances so that one or the other row is in printing position, depending upon which lever is actuated, means for selectively determining which of said two levers is to be actuated on each rotation of said cam, means effective for each character received to rotate said cam, and means for printing from a row of type on said typewheel when said row is in printing position.

15. Page printing telegraph receiver comprising a rotatable platen, a spline shaft parallel to the axis of said platen, a carriage movable along said spline shaft, a typewheel mounted in said carriage with its axis substantially at right angles to the axis of said platen, a gear wheel mounted on said carriage so as to be freely rotatable about said spline shaft, a sleeve keyed to said pline shaft and movable with said carriage, a coupling member on said spline shaft between said gear wheel and said sleeve, means on said gear wheel and said sleeve respectively engaging said coupling member, means connecting said typewheel and said gear wheel, means for selectively rotating said spline shaft to select a type on said typewheel, means for actuating the selected type for printing and means for traversing said movable carriage along said spline shaft for letter spacing.

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