Aug. 4, 1925. 1,548,168

H. PFANNENSTIEHL

PRINTING TELEGRAPHY

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Fig. 7

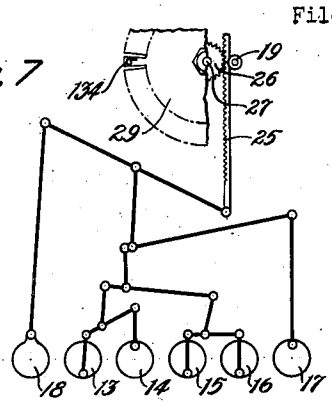


Fig. 8

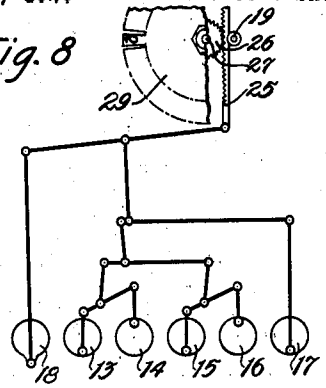


Fig. 17

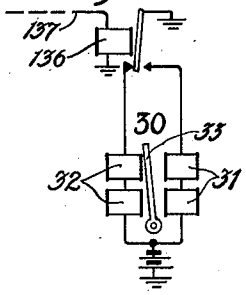


Fig. 18

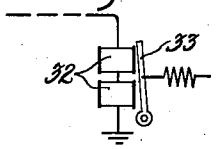


Fig. 1

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PRINTING TELEGRAPHY

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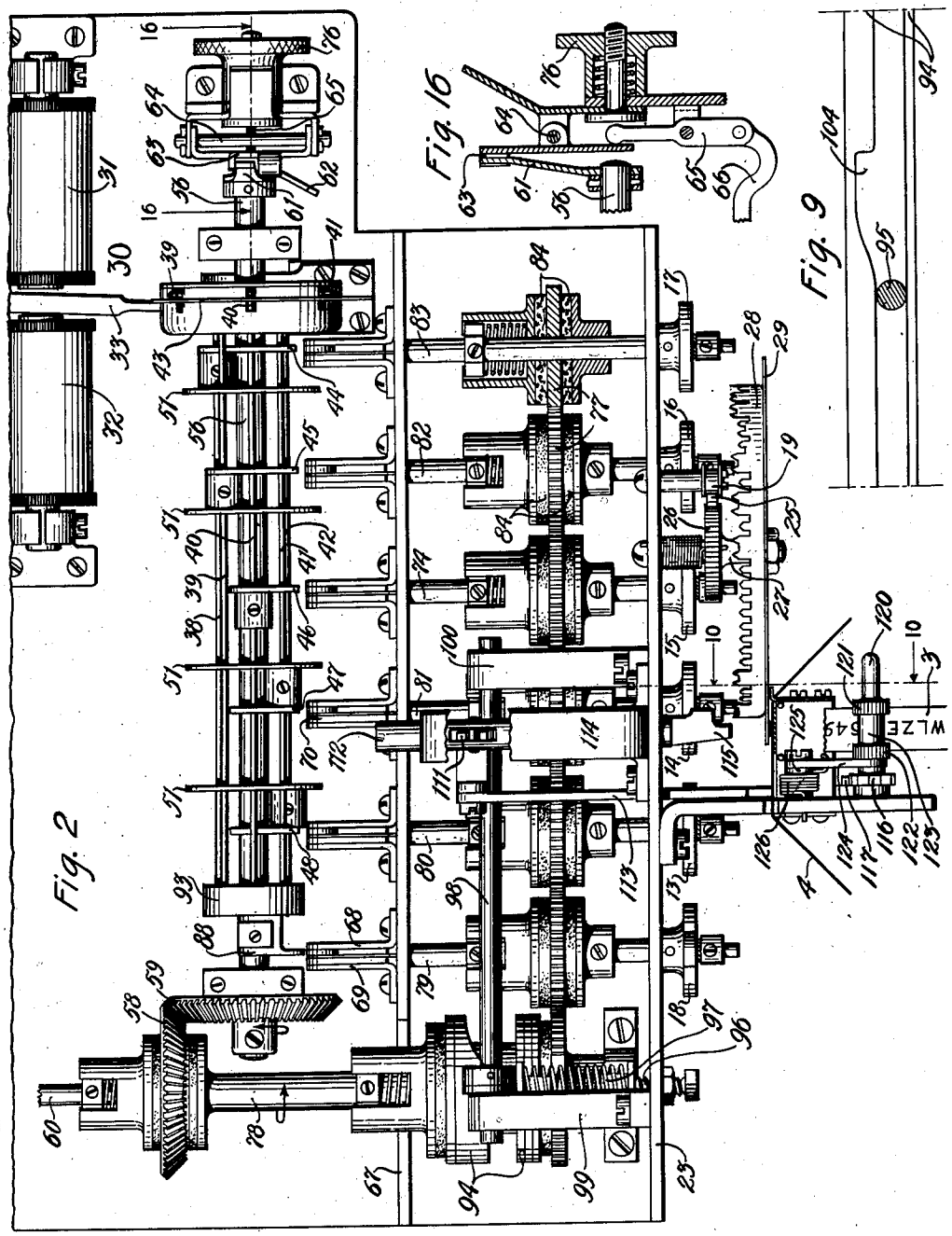


Fig. 2

Fig. 16

Fig. 9

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Fig. 4

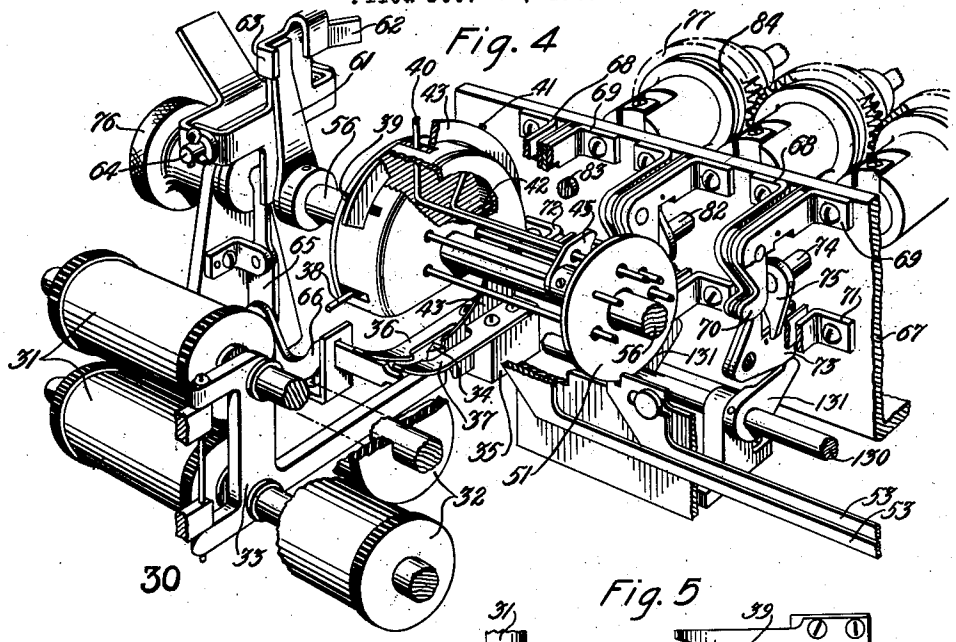


Fig. 5

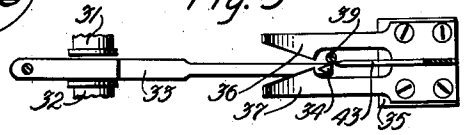


Fig. 6

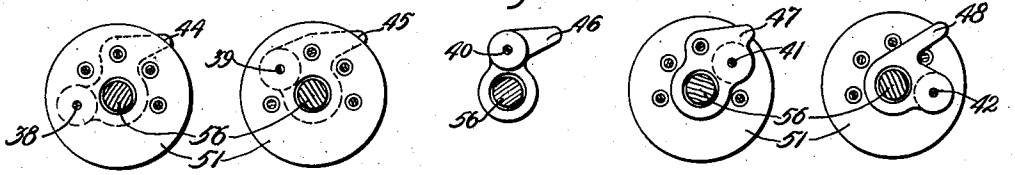


Fig. 12

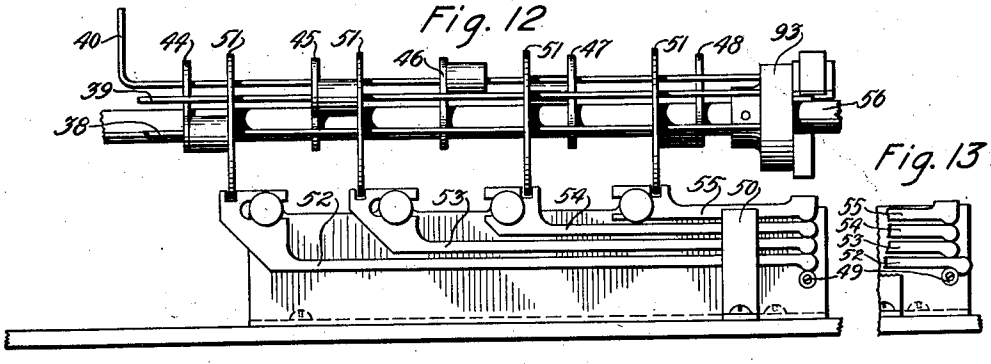


Fig. 13

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PRINTING TELEGRAPHY

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Fig. 11

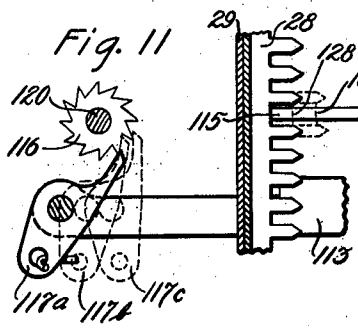


Fig. 10

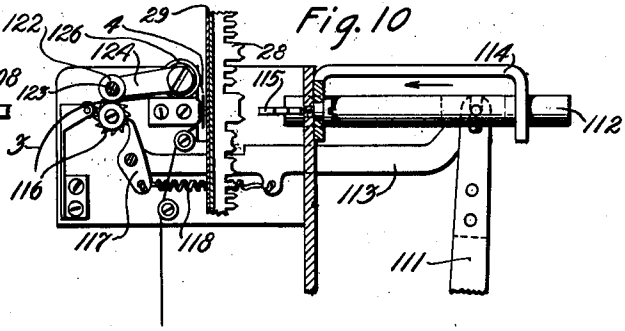


Fig. 14

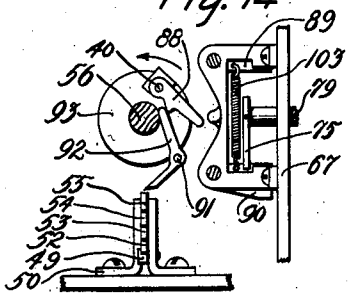


Fig. 3

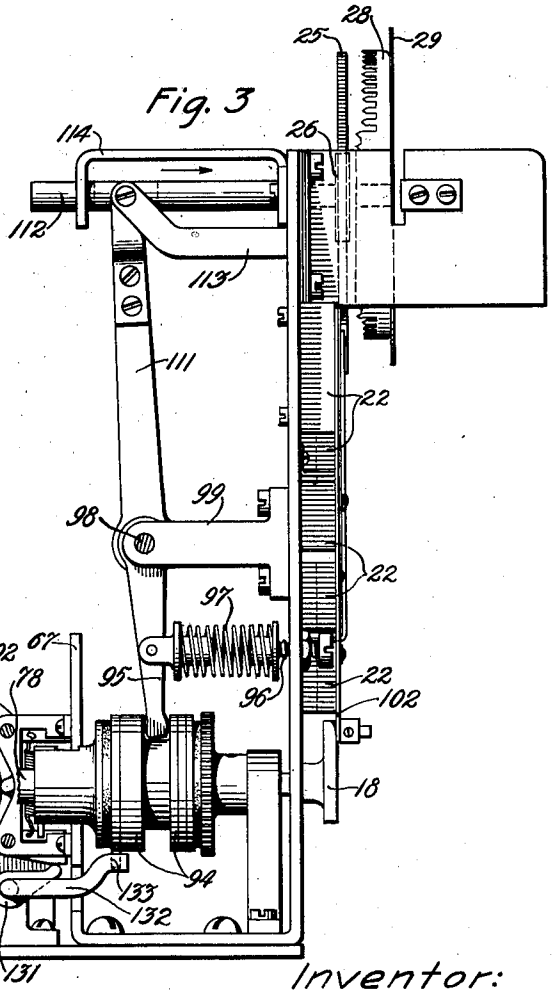
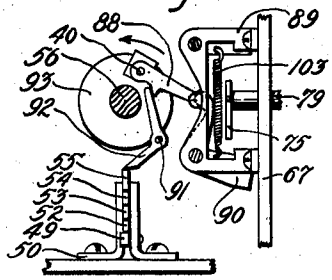
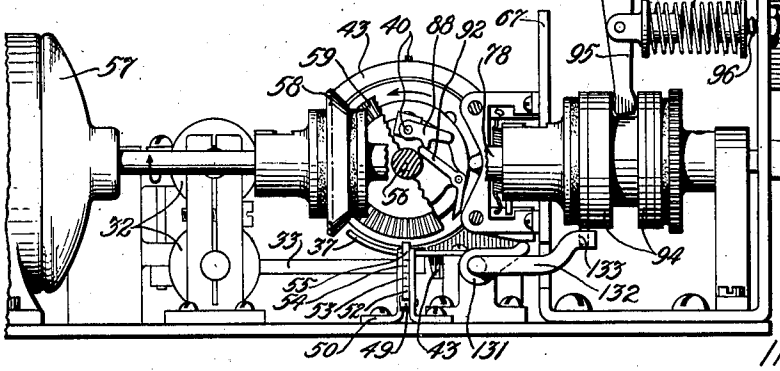


Fig. 15





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Patented Aug. 4, 1925. 1,548,168

UNITED STATES PATENT OFFICE.

HARRY PFANNENSTIEHL, OF MAPLEWOOD, NEW JERSEY, ASSIGNOR TO WESTERN ELECTRIC COMPANY, INCORPORATED, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

PRINTING TELEGRAPHY.

Application filed December 24, 1920. Serial No. 432,953.

To all whom it may concern:

Be it known that I, HARRY PFANNENSTIEHL, a citizen of the United States, residing at Maplewood, in the county of Essex, State of New Jersey, have invented certain new and useful Improvements in Printing Telegraphy, of which the following is a full, clear, concise, and exact description.

This invention relates to printing telegraphy and more particularly to printing telegraph receiving devices of the type wherein a message is recorded in printed characters on a paper tape.

Its object is a telegraphic printer in which the number of electromagnetic devices is reduced and in which the various selecting and printing operations are, so far as possible, mechanically controlled and positive in action.

The invention comprises a flat printing disc, the periphery of which is divided by means of radial slots into a plurality of flexible reeds. On these reeds are carried the type representing the letters of the alphabet, numerals, punctuation marks, etc., which are necessary for the printing of a message. The disc is capable of rotation so as to bring any desired type in front of a printing hammer, which, when operated, forces the flexible reed carrying the type against the paper tape. The type disc is rotated by means of a rack and pinion driven through a system of levers by a series of rotatable shafts, each of which by means of a definite and predetermined degree of rotation is capable of imparting a definite and characteristic degree of rotation to the type disc. The rotatable shafts are selectively controlled and may be operated in any desired combination to impart any desired degree of rotation to the type disc. These rotatable selecting shafts tend normally to revolve due to their frictional association with a train of gears driven by a constantly running motor. They are, however, held against rotation by a series of latches, the tripping of which is controlled by a set of selecting rods which are successively brought under the control of a single selecting magnet in phase with the receipt of impulses from the line and which are therefore moved into tripping or non-tripping position with respect to the latches depending upon the nature of the impulses received.

The movement of these selecting rods with respect to the selecting magnet is effected by means of a shaft driven through a friction clutch by the printer motor. This shaft is normally held against rotation by a catch which is released by the initial line impulse and acts automatically to stop the shaft at the end of the series of selecting impulses representing a single character or single operation of the printer.

The invention will be more clearly understood from the following description when taken in conjunction with the accompanying drawings wherein Fig. 1 is a front view of a receiving printer having a portion of the casing broken away to disclose some of the cooperating mechanism. Fig. 2 is a plan view. Fig. 3 is an end view showing the mechanism for effecting the printing of the character after the type wheel has been positioned. Fig. 4 shows in perspective a portion of the receiving printer. Fig. 5 illustrates the method of positioning the selecting rods; Fig. 6 illustrates the various forms of the cams employed for releasing the setting mechanism. Fig. 7 illustrates the position assumed by the bars for the printing of a particular character. Fig. 8 illustrates the position assumed by the bars and the shifting mechanism for the printing of a numeral. Fig. 9 is a development of the cam employed for causing the operation of the printing mechanism. Fig. 10 is a detail taken along the broken line 10—10 of Fig. 2 and shows the method of advancing the tape. Fig. 11 shows various positions of the stepping pawl for causing the advancement of the tape. Fig. 12 discloses a series of operating members together with the cooperating members for shifting the type wheel from figures to letters and vice versa. Fig. 13 illustrates the operating members shown in Fig. 12 in an off normal position. Fig. 14 discloses the cam operating mechanism for releasing the shaft controlling the movement of the type wheel from letters to figures and vice versa. Fig. 15 illustrates the manner in which the cam shown in Fig. 14 engages the latch for releasing the shaft. Fig. 16 is a view taken along the broken line 16—16 of Fig. 2. Fig. 17 is a diagrammatic showing of the circuit connections with the line relay, while Fig. 18 illustrates an alternative arrangement of Fig. 17.

Referring now to the drawing and the particular embodiments illustrated therein, there is shown in Fig. 1 a front view of the printer illustrating the arrangement of a plurality of pivoted bars 5, 6, 7, 8 and 12. Each of these bars is pivoted so that the distance through which they may be moved is different, that is, upon the movement of the member 5 in either a downward or upward direction a rack 25 will be moved through a given distance. Likewise if the bar 6 is caused to move in a downward direction due to the movement of connecting links 10 and 11 and the bar 7, the rack 25 will be moved through a different distance. By arranging these bars in this manner the various combinations of steps necessary for shifting or moving the type wheel from one position to another are attained. It is thus seen that one of the bars is designed to move the type wheel through a distance of sixteen steps corresponding to a like number of characters, a second one through eight steps, a third through four steps, a fourth through two steps, and a fifth through one step. It is thus possible to position the type wheel in alignment with the tape or printing medium and the printing mechanism for the printing of any desired letter of the alphabet, numeral or other special character. In order that the bars may be moved for the setting of the type wheel, each of the connecting links is connected with a disc such as 13. Also to permit the ready movement of the connecting links as well as the bars, guide blocks 22 are provided. These blocks are secured to the face plate 23 of the printer.

Connected to the member 9 is the pivoted lever 12 which has one extremity connected with a vertical operating rack 25. This rack has cut on one face thereof a series of teeth designed to engage the teeth of a gear wheel 26 suitably secured to a shaft 27. The meshing of these two parts is maintained by a roller 19. Upon the shaft 27 there is also rigidly secured a wheel 28, which has attached to its outer face a circular disc 29. The disc 29 has cut around the circumference thereof equally spaced radial slots, the portion of the disc intervening between these slots being thus in the form of reeds. The composition of the disc 29 is such that upon the movement of any one of the reeds, the actuated reed will be permitted to be moved forward and upon its release will quickly restore to normal. Upon the reeds, thus formed, the letters of the alphabet and numerals together with the other special characters, are arranged in a single row. Wheel 28 is provided with a rim having cut therein a plurality of teeth of various depths, there being a tooth on opposite sides of each of the reeds carrying the characters. The teeth individual to each of the characters are all of the same width and depth; the other teeth are provided for permitting various stunts, such as, for example, spacing without printing, etc. These teeth are provided also for the purpose of enabling the proper centering of the type disc with respect to the printing mechanism and the tape or printing medium prior to the actual engagement of the printing hammer with the reed carrying the character. Since it is sometimes desired to cause the advancement of the tape without printing, the depth of the teeth is not the same. As will be more clearly understood from the detailed description of the operation of the printing mechanism, means is provided whereby the printing hammer for certain positions of the type wheel is not permitted to go to its fullest extent thereby preventing the printing of a character. At the same time, however, the mechanism is so arranged that the tape or other printing medium will be advanced to position an unprinted area before the printing mechanism.

The selecting mechanism comprises a single selecting magnet 30 having a pair of oppositely positioned coils 31 and 32. These coils are arranged to effect the movement of a pivoted armature 33 to which there is secured a beveled extension 34. Connected on a block 35 is a pair of guide plates 36 and 37, which serve to guide the end of the selecting rods 38, 39, 40, 41 and 42, upon their rotation, in the path of the beveled extension or projection 34. The selecting rods 38 to 42 extend across the back of the machine and are arranged to be moved horizontally. The movement of the selecting rod is caused by the positioning of the extension 34. In order that the selecting bars will be retained, after being actuated, a semi-circular member 43 is mounted in a manner so that one end thereof, which is also beveled, lies in the central portion of the aperture between the guide plates 36 and 37. Thus if it is desired to position the selecting rod 38 on the outside of the semi-circular member 43, the armature 33 together with the extension 34 would be moved to the right due to the energization of the coils 32, and upon the rotation of the rod 38 as will be hereinafter described, the lateral projection on this rod will be guided on the outside of the circular member 43. Consequently, the rod 38 will be moved to the left a distance equal to the thickness of the member 43 where it will be retained. Individual to each of the selecting rods 38 to 42 and rigidly secured thereto are operating cams or tripping fingers 44, 45, 46, 47 and 48. Fixed to each of the cams or tripping fingers, except 46, is a circular plate 51. Positioned below the plates 51 and having a notch cut in one end thereof

are a plurality of bars 52, 53, 54, and 55. These bars are slidable in a horizontal direction, being moved upon the movement of the corresponding disc in accordance with the positioning of the cooperating selecting rod.

In order that the selecting rods may be revolved for successively positioning the various cams in accordance with the energization of the selecting magnet 30, all five rods 38 to 42 are positioned, but freely movable in a horizontal direction in apertures formed in disc 93 which in turn is keyed to an intermittently revolving shaft 56. This shaft has power communicated thereto from a continuously revolving motor 57 through a pair of beveled gears 58 and 59. The gear 58 is secured to the shaft 60 of the motor 57 by means of a friction clutch comprising the usual parts, and since mechanisms of this character are clearly understood, a detailed description thereof is considered unnecessary here, especially since it does not form a part of the present invention. The beveled gear 59 is rigidly secured to the shaft 56 which has connected to the opposite end thereof an arm 61, which normally is in engagement with a stop member 63. Stop member 63 is rotatably mounted on a shaft 64, the rotation of which is produced due to the movement of a pivoted arm 65, which has secured at one extremity thereof an operating bar 66. Operating bar 66 extends into the path of the extension on the armature 33 and is arranged to be shifted upon the attraction thereof due to the energization of the coils 31 of the selecting magnet 30. By having the arm 65 pivoted and having the free end thereof arranged to engage the stop member 63, this member may be moved through an angle sufficient to permit the arm 61 to be revolved by the power communicated to the shaft 66 from the motor 57 through the beveled gears 58 and 59. Mounted on a back plate 67 is a series of supporting members such as 68 and 69. Pivoted to these supporting members 68 and 69 is a releasing latch 70. Also secured to plate 67 just below the supporting members 68 and 69 is a like series of supporting members 71 and 72. Likewise the supporting members 71 and 72 support a releasing latch 73. The latches 70 and 73 are arranged side by side and are formed in the shape of bell crank levers. The latches 70 and 73 serve when operated to release a shaft 74. These latches such as 70 and 73 are arranged to be operated by the cams secured to the selecting rods 38 to 42 depending upon the position of the selecting rods with respect to the semi-circular member 43; that is, for example, if the selecting rod 38 is on the left of the semi-circular member 43, the cam connected with this rod will thus be in a position to cause the actuation of the latch 73 for permitting the shaft 83 to revolve as hereinafter to be described.

Extending across the back of the machine is a shaft 130. Upon this shaft and just below the latches 73 there is mounted a plurality of operating levers 131 arranged so that upon the movement of any one of the release latches 73, the operating lever 131 will be rotated for imparting a like rotation to the shaft 130. On one end of the shaft 130 there is secured a cam release latch 132. This release latch 132 is normally in engagement with a projection 133 forming a part of cam 94, and since there is also incorporated with this cam a suitable friction clutch of the standard type, the cam is thus retained against rotation as long as the latch 132 is in engagement with the projection 133. However, upon the operation of any one of the operating levers 131, the shaft 130 will likewise be rotated for moving the latch 132 out of the path of the projection 133. Since power is communicated to the friction clutch forming a part of the cam 94 through the shaft 78 from the continuously revolving motor 57, cam 94 will be rotated until the projection 133 again engages the latch 132.

The release of the printing mechanism, as has been previously described, is controlled through the operation of release latch 132. Each of the operating levers 131 secured to the shaft 130 is positioned beneath the release latches 73 and are only designed to be operated by these latches. Thus, in order to effect the printing of a desired character it is necessary that in each selection at least one of the selecting rods 38 to 41 must be moved to the left and positioned on the left-hand side of the semi-circular member 43. By moving one of the selecting rods in this direction, one of the release latches 73 will be operated by a corresponding cam upon the rotation of the selecting rods for rotating the lever 131. The lever 131 in rotating likewise rotates shaft 130. Consequently the latch 132 will be moved out of the path of the projection 133 and the printing mechanism will be operated. By such an arrangement, the unnecessary operation of the printer mechanism is eliminated when the selecting units are such as to position the selecting rods on the right of the semi-circular member 43.

It is often desirous to permit the orientation of the stop member 63 with respect to the driven shaft or the shaft on which it is mounted. This, in the present machine, is accomplished by providing a knurled thumb screw 76. By loosening the knurled thumb screw 76, the stop member 63 may be rotated through any desired angle. In this way the time intervening between the release of the stop arm 61 and the engage-

ment of the first selecting rod 38 with the extension 34 on the armature 33 may be varied, while the printer is in operation.

Secured to one end of the shaft 74 is a stop member 75 normally in engagement with either the release latch 70 or 73. Associated with the shaft 74 is a continuously driven gear 77, to which power is communicated from a continuously revolving motor 57 through a shaft 78 and a series of like gears secured to shafts 79, 80, 81, 82, and 83. Disposed on each side of the gear 77 is a disc of frictional material 84, such as wood or the like. It is thus seen that by such an arrangement the friction clutch of the usual form is provided, and upon the release of the stop member 75 the shaft 74 will be permitted to revolve until the stop member 75 again engages either the release latch 70 or 73 depending upon which of these latches had been operated previously. To the other extremity of the shaft 74 there is secured the disc 15 mounted on the front of the machine and having secured thereto the operating link 11. Likewise each of the shafts 79, 80, 81, 82 and 83 have secured thereto a gear wheel similar to gear wheel 77. There is also placed on opposite sides of the respective gear wheels a disc of friction material, such as for example, wood, although other materials may be substituted therefor. Rigidly secured to each of the shafts 79, 80, 81, 82 and 83 is also a stop member 75 similar to the stop member secured to the shaft 74. This stop member 75 likewise engages the release latches designated by numerals 70 and 73, each of the shafts being arranged to revolve upon the operation of the release latches through an angle of 180°. The shafts 79, 80, 81, 82 and 83 together with the shaft 74 project beyond the face plate 23 and have secured thereto the discs 13, 14, 15, 16, 17 and 18. As previously described, the discs 13, 14, 15, 16 and 17 control the movement of connecting links connected with the various connecting levers on the front of the machine. Upon the setting of the last selecting rod, the cams thereon engage their associated latch for causing the simultaneous rotation of the discs to select the desired character. As shown in Fig. 6, all of the cams or tripping fingers 44 to 48 are arranged so that following the setting thereof, in accordance with the energization of the selecting magnet 30, the release latches 70 or 73 will be operated simultaneously upon the continued rotation of the selecting rods.

Also secured to the selecting rod 40 which carries the operating cam 46, is a cam 88. The cam 88 is arranged, when rendered effective as will be described hereinafter, is adapted to operate the release latches 89 and 90 depending upon the position of the selecting rod 40 with respect to the semi-circular member 43. Latches 89 and 90 are secured in the same manner as latches 70 and 73. It might be noted here that there is connected between each set of latches a coiled spring, such as 103. The function of this spring is, of course, obvious. Associated with the cam 88 and secured to the same disc 93 is a bell crank lever 92, which is pivoted to the disc 93 at 91, and has one extremity positioned in alignment with a projection on the cam 88. The other end of the bell crank lever 92 is arranged to engage the free end of the auxiliary member 55. The engagement with this member, however, will not be effected when any of the discs 51 are moved to the right, as the members 52, 53, 54 and 55 will be moved, as is more clearly shown in Fig. 13, to a position whereby the bell crank lever 92 is not permitted to engage the free end of member 55. Consequently the cam 88 remains in the position shown in Fig. 14 and does not engage either of the latches 89 or 90 to cause the release of the stop member 75 for permitting the shaft 79 to revolve. However, if all of the members 52, 53, 54, and 55 are moved to the left so as to be in a position similar to that illustrated in Figs. 12 and 15, the bell crank lever 92 engages the free end of the member 55. The upper end of the bell crank lever 92 thereupon engages the projection on the cam 88, which is moved upon the rotation of shaft 56 so as to effect the engagement thereof with the release latches 89 or 90, depending upon the position of the selecting rod 40 with respect to the semi-circular member 43. The arrangement just described is for the purpose of shifting the type wheel from the portion carrying the letters to the portion upon which the figures are mounted or vice versa. As upon the rotation of the shaft 79 due to the release of the stop member 75, the disc 18 will be revolved through an angle of 180°. The connecting link 102 secured to the disc 18 will thereupon be moved through a distance sufficient to move the member 12 whereby the type wheel 29 will be shifted through a relatively large angle.

Connected to the shaft 78 is a cam 94 shown in developed form in Fig. 9. Cooperating with this cam is the free end of a pivoted lever 95, which has attached thereto at a point intermediate its ends an adjustable member 96. Adjustable member 96 is provided with a coil spring 97, and is arranged in such a manner that the lever 95 will be quickly moved from one position to another the instant the free end thereof reaches the depressed portion 104 of cam 94. Positioned just above cam 94 is a shaft 98 extending transversely to the center of the machine. The shaft 98 is supported by brackets 99 and 100, and has rigidly secured thereto the lever 95. Thus upon the move-

ment of the lever 95 in accordance with the rotation of cam 94 the shaft 98 will be revolved. Also secured to the shaft 98 is an operating lever 111. Operating lever 111 has mounted at its other extremity a striker bar 112 and a member 113. The bar 112 is supported by a bracket 114 and may be freely moved upon the movement of the member 111 due to the rotation of the shaft 98. Mounted on the free end of the striker bar 112 is a member 115, which serves two purposes; one to correctly align the type wheel 29 with the extreme projection of the member 113 and the tape 3, the other the movement of the type wheel 29 into engagement with the ribbon 4 for causing the impression of the desired character on the tape 3. As previously described, the rim of wheel 28 is provided with variously shaped teeth, those individual to the characters are, however, of the same shape. Thus upon the engagement of the member 115 with the walls of any of these teeth, any slight displacement of the type wheel 29 will be corrected.

The mechanism for causing the advancement of the tape 3 comprises among other parts, a ratchet wheel 116 and a stepping pawl 117. The stepping pawl 117 is mounted at the extreme end of the member 113, there being also provided a retractor spring 118 for retaining the stepping pawl 117 in a predetermined position. Resting on the tape 3 is a pair of finely toothed wheels 121 and 122. These wheels are positioned on a shaft 123, which is in turn supported by a member 124. The member 124 is rotatably mounted on a shaft 125, a suitable coil spring 126 being arranged to hold the wheels 121 and 122 in contact with the tape 3. Beneath the wheels 121 and 122 and secured to the same shaft 120 as the ratchet wheel 116 is a like pair of wheels. Thus, upon the movement of the ratchet wheel 116, and consequently the rotation of the shaft 120, the tape 3 will be advanced in accordance with such a movement. As is more clearly shown in Fig. 10, upon the movement of the striker bar 112 in the direction of the arrow together with the member 113, the stepping pawl 117 will be caused to engage a tooth in the ratchet wheel 116, and upon the complete backward movement of the member 113, the ratchet wheel 116 will be advanced one tooth. Consequently, the tape 3 will be advanced to a position whereby an unprinted area is positioned in front of the type wheel.

Inasmuch as the mechanism for advancing the inking ribbon after each printing is standard equipment, such as employed in typewriters of well known makes, a description together with a detailed showing thereof has been omitted, especially since it does not form a part of the present invention.

It is often desired to cause the advancement of the tape without effecting the printing of a character. This feature in the present invention is accomplished by advancing the type wheel to a position whereby one of the shallower cut teeth is in alignment with the projection 115 on the striker bar 112. Upon the extending of the striker bar 112 to a position where the shoulder thereof engages the outer edge of the tooth designated by the numeral 128, the member 113 will be moved a distance sufficient to permit the stepping pawl 117 to engage the next succeeding tooth in the ratchet wheel 116 for effecting the rotation thereof upon the withdrawal of the member 113 and the rod 112, printing being, however, prevented due to the engagement of the shoulder on striker bar 112 with the tooth 128. Should the wheel 28 be positioned with the tooth 108 in alignment with the striker bar 112 neither printing nor spacing is performed as the shoulder on this bar engages the bottom of this tooth before either functions are performed. The positions assumed by the stepping pawl 117 just described are best shown in Figure 11 and designated by 117^A, 117^B and 117^C respectively.

The receiving telegraph printer hereinbefore described is operated preferably by various combinations of five selecting current units with an additional impulse preceding the selecting units for conditioning what may be termed the distributing mechanism for operation. Impulses may arrive over the line and pass through a line relay 136 having both front and back contacts. To the front and back contacts, as illustrated in Fig. 17, are connected the windings of the coils 32 and 31 of the electromagnet 30 respectively. It may also in some cases be advisable to eliminate the line relay and use but one set of coils of the electromagnet 30, as shown in Fig. 18, and provide in place of the other set of coils a retractor spring for normally biasing the armature. Thus the armature 33 of the electromagnet 30 would be moved only in response to current impulses of a predetermined polarity, the armature at all times assuming a normal position.

A better understanding of the apparatus hereinbefore described may be had from a description of a particular type selection and the operations incident thereto. For the sake of clearness let it be assumed that it is desired to select and point the character "p". Further assume that the character "p" composes the following selecting current units, no current, current, current, no current and current. Also assume that the type wheel 29 is in a position for printing of the characters of the alphabet. Preceding the above selecting units it is necessary to transmit a starting unit which, in the present case, amounts to opening the line circuit. The opening of the line removes

current therefrom and causes the de-energization of line relay 136 and the consequent energization of the coils 31 of electromagnet 30 for attracting the armature 33 to the left. The movement of the armature 33 in this manner imparts a like movement to the member 66, which has connected thereto the pivoted member 65, as is more clearly shown in Fig. 16. Upon the movement of the member 65, its free end will be rotated in such a direction as to move the stop member 63 out of the path of the stop arm 61. The instant the stop member 63 is revolved in this manner. the shaft 56 is free to rotate, and since power is communicated to this shaft from the constantly operating motor 57 through a friction clutch associated with the beveled gear 58, this shaft will be revolved. The first impulse making up the group of impulses individual to the character P being of the same character as that required to operate the mechanism for releasing the shaft 56 for rotation, line relay 136 is again de-energized for completing an energizing circuit for coil 31 thereby moving the armature 33 to the left. Upon the movement of the armature 33 in this manner, a beveled extension or projection 34 carried thereby will be positioned opposite to that shown in Fig. 5. As previously described the rods 38 to 42 inclusive are revolved with the shaft 56 so that upon the engagement of the bent end of the first of the selecting rods such as 38 therewith, the projection on this rod will pass to the right of the semi-circular disc 43, in which position it will be held until the character of the selection is changed. The positioning of the bent end of the rod 38 to the right of semi-circular disc 43 causes the movement of the entire rod through a distance sufficient upon the continued rotation of this rod to permit the cam 44 secured thereto to engage the release latch 70. Upon the transmission of the next selecting unit which consists in the application of current to the line conductor, line relays 136 is energized and coils 32 energize for attracting the armature 33 to the right. The beveled extension 34 is likewise moved to close the path to the right of the semi-circular disc 43 for causing the movement of the selecting rod 39 to the left of this disc 43. The next selecting unit forming the group selected being the same as previously described, coils 32 will be energized and the armature 33 moved to the right whereby the projection on the selecting rod 40 will pass to the left of the semi-circular disc 43 as did rod 39. This rod in passing to the left of the semi-circular disc 43 moves the cam secured thereto through a distance sufficient to permit its engagement with the release latch 73. For the next selecting unit the selecting rod 41 will be positioned whereby the cam secured thereto will actuate the release latch 70 upon the continued rotation of the selecting rods. The last impulse of the group of selecting units consists in applying current to the line whereby coils 32 will be energized for attracting the armature 33 to the right, consequently the extension 34 will be moved in a like direction so that upon the engagement of the selecting rod 42 with its beveled edge, this rod will pass to the left of the semi-circular disc 43.

Owing to the shape and manner of securing the cams or tripping fingers to the selecting rods, the release latches which hold the shafts 74, 80, 81, 82, 83 against rotation will be operated simultaneously. For the particular selection chosen, the release latches 70 or 73 will be operated whereby the shafts held thereby will be allowed to rotate by the gearing arrangement and friction clutches as previously described, so as to position the discs secured to the respective shafts in a position indicated in Fig. 7. The positioning of the discs 13 to 17 inclusive in the manner just described imparts to the bars 5, 6, 7, 8 and 12 a motion resulting from the simultaneous rotation of the discs 13 to 17 inclusive, whereby the lever 12 will move the rack 25 through a predetermined distance. The movement of the rack 25 likewise causes the rotation of the gear 26, and since the gear 26 is rigidly secured to the wheel 28, and in turn the type wheel 29, the letter "p" will be positioned in alignment with the projection 115 on the striker bar 112 and an unprinted area of the tape 3. Following the positioning of the discs 13 to 17 in the manner just described, and the operation of the lever 131 for rotating shaft 130, the latch 132 will be moved out of the path of the projection 133. The movement of the latch 132 out of the path of the projection 133 permits the cam 94 to revolve. The cam 94 will thereupon be set in rotation, and since the depressed portion 104 is arranged to permit the lower end of the lever 95 to fall therein, the energy stored in the spring 97 will be released. Consequently the shaft 98 will be rotated, and since the member 111 is rigidly secured to this shaft, the striker bar 112 together with the member 113 will be moved in the direction of the arrow. The movement of the striker bar 112 in this direction causes the outer surface of the projection 115 to engage the walls of the teeth in the wheel 28. The width of the projection 115 is substantially the same as the width of the teeth. Thus, the wheel 28 together with the type wheel 29 will be shifted to correct any slight degree of displacement, and the selected character will be properly positioned in front of the tape 3 or other printing medium. Upon the further extension of the striker bar 112 the extreme end of the pro-

jection 115 engages the reed 134 of the type wheel 29 carrying the character "p" and causes the impression of this character on the tape 3.

At the same time, the member 113 is moved forward together with the stepping pawl 117. The stepping pawl 117 in moving in this manner engages the next succeeding tooth in the ratchet wheel 116. Upon the restoration of the member 111 due to the engagement of the lever 95 with straight surface of cam 94, which rotates the shaft 98 in a direction opposite to that previously described, the stepping pawl 116 by the action of the spring 118 causes the rotation of the ratchet wheel 116 through a distance equal to that of one tooth. The shaft 120 is thus rotated, and since the finely toothed wheels similar to the ones designated by the numerals 121 and 122 are also rotated, the tape 3 will be advanced to position an unprinted area in front of the type wheel.

Just before the stop arm 61 has completed its cycle of rotation, it engages the projecting portion 62 on the stop member 63. The projecting portion 62 is bent inward so that by the continued rotation of the stop arm 61, the stop member 63 will be restored to normal for arresting the arm 61.

Assuming that it is desired to shift the type wheel 29 from the portion carrying the letters of the alphabet to the portion on which the figures and other special characters are mounted, it is necessary to transmit a definite series of selecting units. Such a series of impulses is as follows: current, current, no current, current and current. The electromagnet 30 in responding to such units causes all of the selecting rods with the exception of the one carrying the cam 46 to be positioned on the left of the semi-circular member 43. With such a setting, the members 52, 53, 54, and 55 will be all moved to the left, thus arranging the free ends thereof in the manner illustrated in Fig. 12. It is, of course, understood that the stop member 63 had been rotated, as previously described in connection with the selection of the character "p" for releasing the stop arm 61, shaft 56 is thereupon permitted to rotate. As the shaft 56 rotates following the setting of the selecting rods, as before described, the lower end of the bell crank lever 92 strikes against the surface of the member 55. Due to the engagement of the lower portion of the bell crank lever 92 with the member 55, the projection on the cam 88 is caused to move in an upward direction. As the cam 88 is moved in this direction the latch 90 is rotated about its pivot. The rotation of the latch 90 in this manner causes the release of the stop arm 75 secured to the shaft 79. Shaft 79 is thus permitted to revolve due to power communicated from the continuously running motor 57 through the shaft 78 and the suitable gear train until the stop arm 75 engages the release latch 89. The rotation of the shaft 79 causes the disc 18 to be revolved through an angle of a 180°. The disc 18 in revolving through an angle of 180° moves the lever 102 through a distance sufficient to impart, with the aid of the movement of the discs 14, 15, 16 and 17 to a position opposite to the one illustrated in Fig. 1, a movement to the lever 12 together with the vertical rack 25, for positioning the type wheel 29 to print numerals and other special characters. Following the positioning of the type wheel 29 in this manner, assuming that it is desired to print the numeral 6, the following set of selecting units would be transmitted: current, no current, current, no current and current. The electromagnet 30 in responding to these impulses positions the selecting rods upon the rotation of the shaft 56 in a manner whereby the respective cams secured thereto will cause the discs 13, 15 and 17 to be revolved so that the connecting links secured thereto will be in a downward position. This arrangement is best shown in Fig. 8. The other discs 14 and 16 will be in a position 180° from the position assumed by the discs 13, 15 and 17. With the disc 18 in a position 180° from its normal position, the type wheel 29 will be positioned so that the numeral 6 is in alignment with the projection 115 on the striker bar 112 and the transmitting tape 3 or other printing medium. The printing of the numeral 6 is effected in the same manner as previously described in connection with the character or letter "p". Further description of the operation of the system in this respect is therefore considered unnecessary.

If it is desired to unshift the type wheel, as for example, from the portion on which the numerals or other special characters are mounted to the portion carrying the letters of the alphabet, the following series of selecting units will be transmitted: current, current, current, current and current. As before the selecting rods carrying the cams 44, 45, 47, and 48 will be all moved to the left. Consequently, the members 52, 53, 54 and 55 will be moved so that the free ends thereof will be positioned as shown in Fig. 12. The selecting rod carrying the cam 46 will also be moved to the left, the lateral projection thereof being positioned to the left of the semi-circular member 43. Following the setting of the cams in this manner, and the continued rotation of the shaft 56, the bell crank lever 92 will be operated as previously described for causing the rotation of the cam 88. Since the selecting rod carrying the cam 46 has also secured thereto the cam 88, this cam will be shifted so as to engage the release latch 89 upon the engagement of the bell crank lever with its

projection. Release latch 89 upon being operated permits the release of the stop member 75 and the consequent rotation of the shaft 79. The disc 18 having secured thereto the lever 102 will be moved through an angle of 180° to its extreme upward position. The type wheel 29 will thus be shifted from the position carrying the numerals or other special characters to the portion on which the letters of the alphabet are mounted. The printing of a letter in this portion of the wheel is brought about in the same manner as previously described in connection with the printing of the letter "p".

Although the present invention has been disclosed in connection with a receiving printer wherein the characters are printed in a continuous line, it is, of course, obvious that several of the embodiments of the invention may be incorporated in receiving printers of the type commonly referred to as page printers without departing from the spirit and scope of the present invention.

What is claimed is:

1. In a printing telegraph receiver, a type wheel positioning mechanism comprising a set of rotatable shafts, each arranged by a half revolution thereof to impart a definite and characteristic degree of rotation to said type wheel, and means selectively operable to permit a half revolution of selected ones of said shafts to produce a desired cumulative rotation of said type wheel.

2. In a printing telegraph receiver, a type wheel positioning mechanism comprising a set of rotatable shafts, each arranged by a half revolution thereof to impart a definite and characteristic degree of rotation to said type wheel, a pair of stops for each shaft for holding said shafts against rotation in either of two diametrically opposite positions, means tending normally to rotate said shafts, and selecting mechanism under the control of line impulses for tripping selected ones of said stops, and permitting a half rotation of the shafts associated therewith whereby a desired cumulative rotation is imparted to said type wheel.

3. In a printing telegraph receiver, a type wheel positioning mechanism comprising a set of rotatable shafts, each arranged by a half revolution thereof to impart a definite and characteristic degree of rotation to said type wheel, a pair of stops for each shaft for holding said shaft against rotation in either of two diametrically opposite positions, means tending normally to rotate said shafts, a set of selecting rods corresponding in number to said pairs of stops, each rod carrying a tripping finger individual to a single pair of said stops, and movable longitudinally into position to trip either one or the other of said stops, a selecting magnet, means for bringing said selecting rods successively under the control of said selecting magnet to be selectively positioned thereby, and for bringing the selected tripping fingers into operative engagement with their corresponding stops.

4. In a printing telegraph receiver, a type wheel positioning mechanism comprising a set of interconnected levers of different lengths, a crank for operating each of said levers, a rotatable shaft for operating each of said cranks, a pair of stops for each of said shafts arranged to stop the rotation of said shaft in either of two diametrically opposite positions, and means for selectively tripping one or the other of said stops of each selected set to permit a half rotation of the associated shafts, and means linked with said system of levers for imparting a rotary movement to said type wheel.

5. In a printing telegraph receiver, a type wheel positioning mechanism comprising a rack and pinion for rotating said type wheel, a set of interconnected levers of different lengths connected to said rack, a crank for operating each of said levers, a rotatable shaft for operating each of said cranks, means tending normally to rotate said shafts, a pair of stops for each of said shafts arranged to stop the rotation thereof in either of two diametrically opposite positions, a set of selecting rods corresponding in number to said pairs of stops, each of said rods carrying a tripping finger individual to a single pair of said stops, and movable longitudinally into position to trip either one or the other of said stops, a selecting magnet, means for bringing said selecting rods successively under the control of said selecting magnet, and mechanical means cooperating with said magnet to move said rods to one or the other of two selecting positions, depending upon the character of the energization of said magnet.

6. A printing telegraph receiver comprising a selecting magnet, a plurality of movable selecting rods positioned in accordance with the energization of said magnet, a type wheel having two sets of characters arranged thereon in a single row, and mechanical means controlled by one of said rods when the remaining ones thereof are in a predetermined position for shifting said type wheel from one set of characters to the other.

7. A printing telegraph receiver comprising a selecting magnet, a plurality of horizontally slidable selecting rods positioned in accordance with the energization of said magnet, a type wheel having two sets of characters arranged thereon in a single row, a driving and a plurality of driven shafts, means for normally holding said driven shafts against rotation, means controlled by each of said rods for operating said holding means to release said shafts, additional means secured to one of said rods, and means

operative when said other rods are in a predetermined position for causing the actuation of said additional means to effect the shifting of said type wheel from one set of characters to the other.

8. A printing telegraph receiver comprising a selecting magnet, a plurality of slidable selecting rods positioned in accordance with the energization of said magnet, a type wheel having two sets of characters arranged thereon in a single row, a driving and a plurality of driven shafts, means for normally holding said driven shafts against rotation, means controlled by each of said rods for operating said holding means to release said shafts, additional means secured to one of said rods, and mechanical means operative when said other rods are in a predetermined position for causing the actuation of said additional means to effect the shifting of said type wheel from one set of characters to the other.

9. A printing telegraph receiver comprising a selecting magnet, a plurality of movable selecting rods positioned in accordance with the energization of said magnet, a type wheel having two sets of characters arranged thereon in a single row, a driving and a plurality of driven shafts, means for normally holding said driven shafts against rotation, a cam secured to each of said rods for operating said holding means to release said shafts for rotation through an angle of substantially 180°, an additional cam secured to one of said rods, and means operated when said other rods are in a predetermined position for causing the actuation of said additional cam to effect the shifting of said type wheel from one set of characters to the other.

10. Printing telegraph apparatus comprising a plurality of selecting rods, means for intermittently rotating said rods, a stationary member for retaining said rods in selecting position, a single selecting magnet controlling the positioning of said rods with respect to said stationary member in accordance with the signaling current impulses received, a type wheel, a cam secured to each of said rods, and means operated by said cams for placing the selected character on the type wheel in a position to be printed.

11. A printing telegraph receiver comprising a plurality of selecting rods, an intermittently revolving shaft associated with said rods, means for normally holding said shaft together with said rods against rotation, a single selecting magnet, means controlled by said selecting magnet for permitting the rotation of said shaft, said selecting magnet being responsive to selecting current impulses for positioning said selecting rods in predetermined combinations in accordance with the desired character, tripping members secured to each of said rods, a type wheel, and mechanical means brought into operation by said tripping members to impart to said type wheel a motion sufficient to position the desired character in a printing position.

12. A printing telegraph receiver comprising a selecting mechanism including a series of bars rotatable through a substantially complete circular path arranged to be operated in predetermined combinations, a type wheel, means controlled through the setting of the bars of said selecting mechanism for positioning the desired character on said type wheel, a printing medium, a printing hammer, and mechanical means operated due to the setting of the selecting mechanism for causing said printing hammer to print the desired character on said printing medium.

13. In a printing telegraph receiver, selecting mechanism responsive to line current impulses, a type wheel, means controlled by said selecting mechanism to rotate said type wheel positively to a predetermined point, a printing medium, means for advancing said printing medium to an unprinted area, a striker bar, and means common to said advancing means and said striker bar for causing their successive operation.

14. In a printing telegraph receiver, selecting mechanism responsive to line current impulses, a disc having radial slots forming a plurality of reeds, characters carried by said reeds, a toothed wheel secured to said disc, means controlled by the selecting mechanism to simultaneously rotate said wheel and disc to a predetermined point, a printing medium, a striker bar, and means mounted on said striker bar and engaging a tooth in said wheel for correctly aligning the selected reed with respect to the striker bar and printing medium.

15. In a printing telegraph receiver, selecting mechanism operable in accordance with line current impulses, a disc having radial slots forming a plurality of reeds, characters carried by said reeds, means selectively operable by said selecting mechanism for imparting a rotary movement to said type disc, a printing hammer, a printing medium, and means associated with said disc for limiting the travel of said printing hammer on the rotation of said disc to a predetermined position to prevent the printing of a character.

16. In a printing telegraph receiver, selecting mechanism operable in accordance with line current impulses, a disc having radial slots forming a plurality of reeds, characters carried by said reeds, means selectively operable by said selecting mechanism for imparting a rotary movement to

said type wheel, a printing hammer, a printing medium, means for advancing said printing medium, and means associated with said disc, and effective upon the rotation thereof to a predetermined position for permitting the operation of said advancing means, but limiting the travel of said printing hammer sufficiently to prevent the engagement thereof with one of said reeds.

17. In a printing telegraph receiver, selecting mechanism operable in accordance with line current impulses, a disc having radial slots forming a plurality of reeds, characters carried by said reeds, a series of shafts and connecting levers controlled by said selecting mechanism to rotate said disc to a predetermined point, a printing medium, and a printing hammer operative to engage the reed in alignment therewith for causing the impression of the desired character on said printing medium.

18. In a printing telegraph receiver, a selecting mechanism comprising a rotating shaft, a plurality of selecting elements arranged concentrically about said shaft and rotatable therewith, a lateral projection on each of said elements, a locking vane, a selecting magnet adapted by the setting of its armature upon the rotation of said selecting elements to successively deflect the projection on said elements to one side or the other of said locking vane for selectively setting said selecting elements, and means controlled through the setting of said elements for causing the recordation of the desired character.

19. In a printing telegraph receiver, a selecting mechanism comprising an intermittently rotating shaft, a plurality of longitudinal sliding selecting rods arranged concentrically about said shaft and rotatable therewith, a tripping finger individual to each of said rods, a lateral projection on each of the rods, a locking vane, a selecting magnet having an armature, a beveled extension on said armature arranged to deflect successively upon the rotation of said shaft the projection on said selecting rods to one side or the other of said locking vane for selectively setting said tripping fingers in accordance with the energization of said selecting magnet, and means controlled by said tripping fingers for causing the recordation of the desired character.

20. In a printing telegraph receiver, a selecting mechanism comprising an intermittently rotating shaft, a member arranged to stop the rotation of said shaft, a circular block rigidly secured to said shaft having a plurality of apertures therein, a longitudinally movable selecting rod arranged in each of said apertures, a lateral projection on each of said selecting rods, tripping fingers individual to each of said rods, a locking vane, a selecting magnet for controlling the deflection of the projection on said selecting rods to respective sides of said vane upon the rotation of said shaft for selectively setting said tripping fingers, and means controlled by the positioning of said tripping fingers for causing the recordation of the desired character.

21. In a printing telegraph receiver, a selecting mechanism comprising a shaft tending normally to rotate, a member arranged to stop the rotation of said shaft, a plurality of longitudinal selectable selecting rods arranged concentrically about said shaft and rotatable therewith, a projection on one end of each of said rods, a locking vane, guide plates disposed on opposite sides of said vane, a selecting magnet having an armature, an extension on said armature movable in the space intervening between said guide plates to control the successive deflection of the projection on said selecting rods upon their rotation to one side or the other of said locking vane, and a crank operatively associated with said stop member and arranged in one path of travel of the extension on said armature for operating said stop member to permit the rotation of said shaft.

22. In combination, a plurality of rotatable selecting members arranged to occupy either of two positions, means for retaining said members in their actuated position until the character of the selection is changed, and means responsive to selecting units to permit said members to be positioned in predetermined combinations with respect to said retaining means.

23. In combination, a plurality of rotatable and horizontally movable selecting members arranged to occupy either of two positions, a locking vane for retaining said members in their actuated position, and an electromagnet having an armature with a beveled extension for causing said selecting members to be deflected to one side or the other of said locking vane depending upon the energizations of said electromagnet.

24. In combination, a plurality of selecting elements rotatable through a substantially complete circular path arranged to occupy either of two selectable positions, means tending normally to rotate said elements, and electromagnetic means operative for permitting the rotation of said elements and the subsequent positioning thereof in predetermined combinations.

25. In combination, a plurality of rotatable and horizontally movable selecting elements arranged to occupy either of two selectable positions, means tending normally to rotate said elements, a locking vane, and an electromagnet having an armature with a beveled extension operative for permitting the rotation of said elements and the subsequent deflection thereof in predetermined

combinations with respect to said locking vane.

26. In combination, a plurality of selecting elements capable of rotation through a complete cycle arranged to occupy either of two positions, members carried by each of said elements, means tending normally to rotate said elements, and a single electromagnet operative for causing the release of said elements and the subsequent positioning thereof whereby said members are set in predetermined combinations.

27. In combination, a plurality of selecting elements rotatable through a substantially complete circular path and arranged to occupy either of two positions, members carried by each of said elements, means tending normally to rotate said elements, a single electromagnet operative for causing the release of said elements and the subsequent positioning thereof whereby said members are set in predetermined combinations, and means operated by said members upon the continued rotation of said elements.

28. In combination, a plurality of rotatable selecting elements arranged to occupy either of two positions, power-driven means normally tending to rotate said elements, a single electromagnet operative for permitting the rotation of said elements and the setting thereof in predetermined combinations, and means secured to each of said elements for translating the electrical effects of said electromagnet into mechanical movements.

29. In combination, a member movable through varying distances, actuating means therefor comprising a set of rotatable discs, connecting levers movable in accordance with the rotation of said discs, and means linked with said connecting levers and said member for transmitting the accumulative effect of said discs whereby said member is moved a predetermined distance.

30. In combination, a member movable through varying distances, actuating means therefor comprising a set of rotatable discs each arranged by a half revolution thereof to produce a definite and characteristic degree of motion, connecting levers movable in accordance with the rotation of said discs, and a pivoted lever linked with the connecting levers for transmitting the accumulative effect of said discs to produce a desired movement of said member.

31. In combination, a member movable through varying distances, actuating means therefor comprising a set of rotatable discs, means tending normally to rotate said discs, connecting levers movable in accordance with the rotation of said discs, and means for selectively releasing desired ones of said discs whereby the accumulative effects of the discs is transmitted by said levers to cause a corresponding movement of said member.

32. In combination, a rotatable member arranged to be set in different positions, mechanically operated actuating means therefor comprising a set of rotatable discs, connecting levers movable in accordance with the rotation of said discs, and means intermediate said discs and rotatable member for transmitting the accumulative effect of said discs whereby said member is rotated to a pretermined point.

33. In combination, a rotatable member arranged to be set in different positions, actuating means therefor comprising a set of rotatable discs, means tending normally to rotate said discs, connecting levers movable in accordance with the rotation of said discs, and means for selectively releasing desired ones of said discs whereby the accumulative effect thereof is transmitted by said levers to cause a corresponding rotation of said member.

34. In combination, a plurality of selecting elements, means for selectively positioning said elements in accordance with predetermined groups of code combinations of impulses, recording means having a plurality of groups of characters arranged whereby any of the characters thereof may be selected for printing, a printing medium upon which the characters are printed, means for advancing the printing medium from a printed to an unprinted area, means for determining the group from which the characters are to be printed, and means effective upon said determination for preventing the advancement of the printing medium.

35. In combination, a plurality of selecting elements, means for selectively positioning said elements in accordance with predetermined groups of code combinations, a recording mechanism with character carrying elements arranged with both upper and lower case characters, means controlled by said selecting elements for selecting a character carrying element, a printing medium, means for spacing the printing medium, means for shifting the recording mechanism from upper to lower case and vice versa, and spacing cut out mechanism effective upon such shifting operations for preventing the spacing of the printing medium.

36. A translator for printing telegraphs comprising a shaft normally tending to rotate, a plurality of selecting elements spaced about and rotatable with said shaft, a single means responsive to selecting current impulses for releasing said shaft, and subsequently causing the positioning of said elements in combinations according to the selecting current impulses.

37. A translator for printing telegraphs comprising a shaft, a continuously operating motor, a clutch connecting said shaft with said motor, means for normally render-

ing said clutch ineffective, a plurality of selecting elements spaced about and rotatable with said shaft, and a single means responsive to line current impulses for rendering said means ineffective, and subsequently positioning said elements in various combinations in accordance with line current impulses.

38. A translator for printing telegraphs comprising a shaft, a continuously running motor, a friction clutch connecting said shaft with said motor, means for normally holding said shaft against rotation, a plurality of selecting members having different angular positions with respect to said shaft and rotatable therewith, and a single selecting magnet responsive to line current impulses for releasing said holding means and subsequently effecting the positioning of said selecting members in accordance with the line current impulses.

39. A translator for printing telegraphs comprising a shaft, a continuously running motor, a friction clutch connecting said shaft with said motor, means for normally holding said shaft against rotation, a plurality of selecting members having different angular positions with respect to said shaft and rotatable therewith, a single selecting magnet responsive to line current impulses for releasing said holding means and subsequently effecting the positioning of said selecting members in accordance with the line current impulses, and means controlled by the setting of said members for controlling the selection of a particular type.

40. A translator for printing telegraphs comprising a shaft, a stop for normally preventing the rotation of said shaft, a plurality of selecting members positioned about and rotatable with said shaft, means for operating said stop and subsequently positioning the selecting members in accordance with line current impulses, and means for effecting relative adjustment between said selecting elements and the normal position of said stop to compensate for variation in local starting operation and relative starting time.

41. A translator for printing telegraphs comprising a shaft, a stop for normally preventing the rotation of said shaft, a plurality of selecting members positioned about and rotatable with said shaft, means for operating said stop and subsequently positioning the selecting members in accordance with line current impulses, and means for changing the position of said stop to compensate for variations in local starting operation and relative starting time.

42. A translator for printing telegraphs comprising a shaft, a stop for normally preventing the rotation of said shaft, a plurlity of selecting members positioned about and rotatable with said shaft, a single selecting magnet for operating said stop and subsequently positioning the selecting members in accordance with line current impulses, and means for changing the position of said stop to compensate for variations in local starting operation and relative starting time.

43. A translator for printing telegraphs comprising a shaft, a continuously running motor, a clutch for connecting said shaft with said motor, a stop for normally rendering said clutch ineffective and preventing the rotation of said shaft, a plurality of selecting members positioned about and rotatable with said shaft, a single selecting magnet for operating said stop to release said shaft for rotation and to subsequently position the selecting members in accordance with line current impulses, and means for changing the position of said stop to compensate for variations in local starting operation and relative starting time.

44. A translator for printing telegraphs comprising a shaft, a stop for normally preventing the rotation of said shaft, a plurality of selecting members positioned about and rotatable with said shaft, means for operating said stop and subsequently positioning the selecting members in accordance with line current impulses, and means operative during the period of operation of said translator for effecting relative adjustment between said selecting elements and the normal position of said stop to compensate for variations in local starting operation and relative starting time.

In witness whereof, I hereunto subscribe my name this 18th day of December A. D., 1920.

HARRY PFANNENSTIEHL.