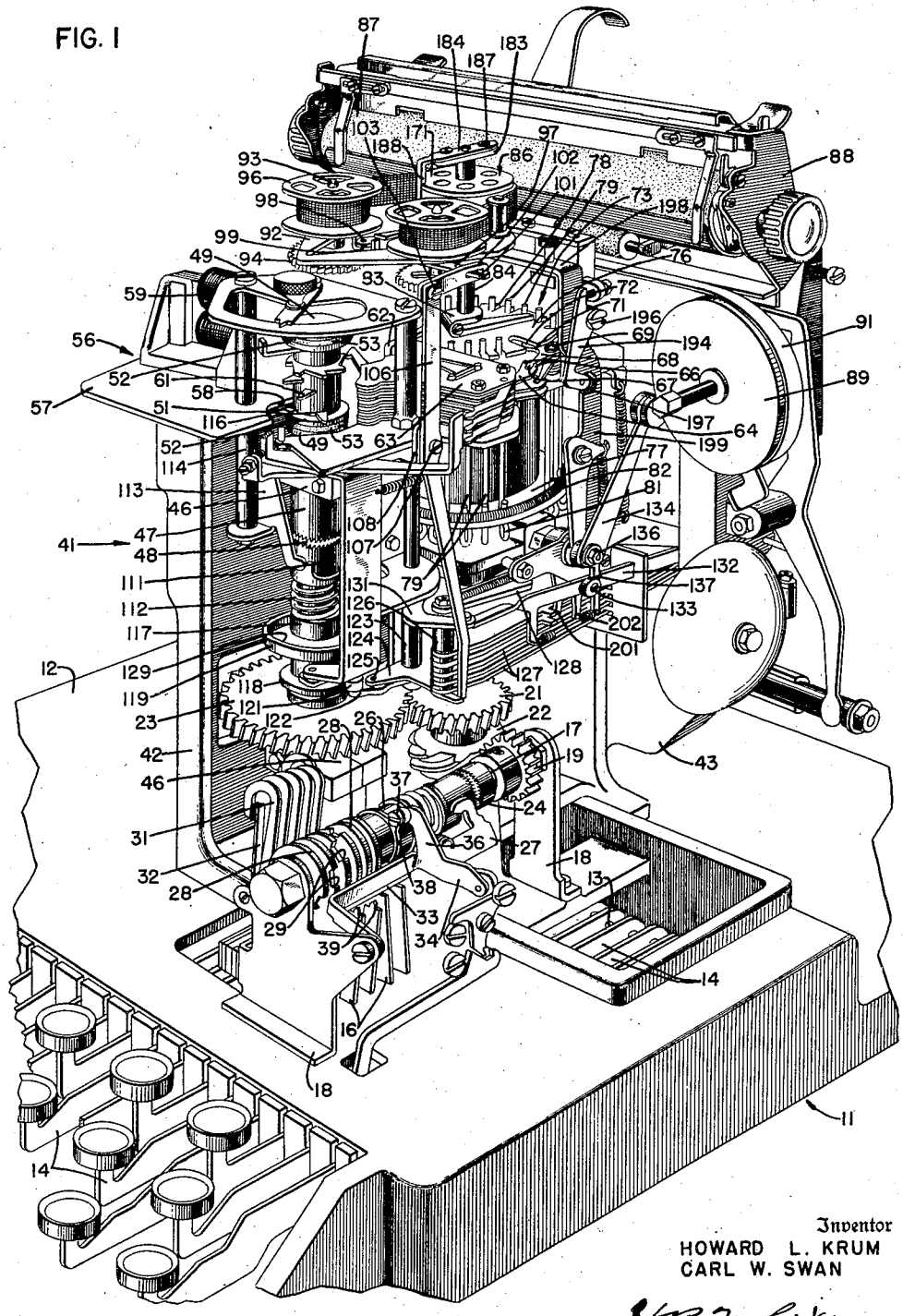
March 19, 1940. H. L. KRUM ET AL 2,193,970

PRINTING TELEGRAPH APPARATUS

Original Filed May 4, 1936 2 Sheets-Sheet 1

FIG. 1



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PRINTING TELEGRAPH APPARATUS

Original Filed May 4, 1936 2 Sheets-Sheet 2

FIG. 2

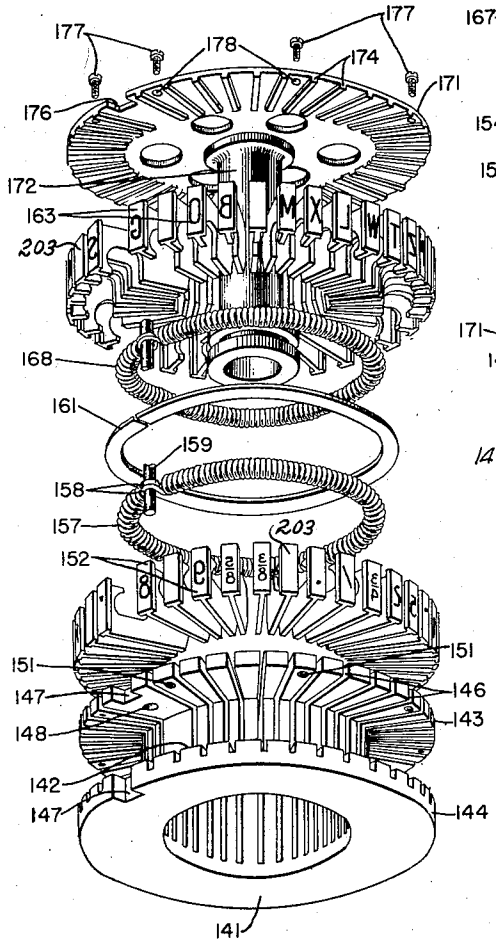


FIG. 5

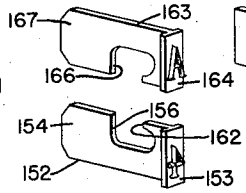


FIG. 6

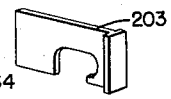


FIG. 7

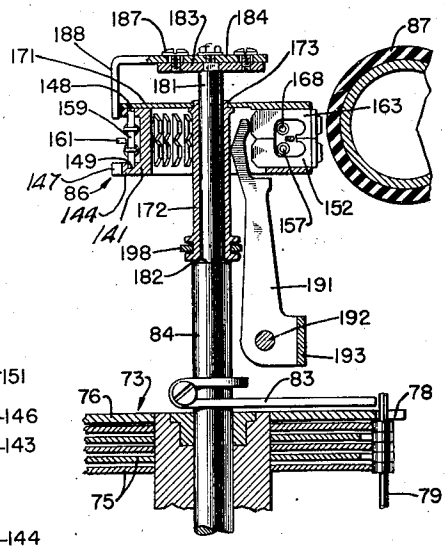


FIG. 4

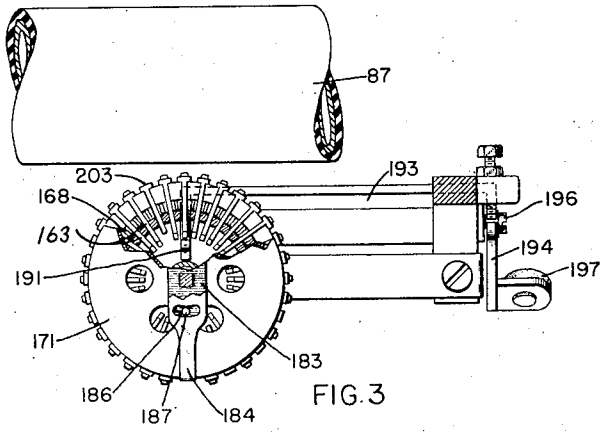


FIG. 3

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Patented Mar. 19, 1940 2,193,970

UNITED STATES PATENT OFFICE

2,193,970

PRINTING TELEGRAPH APPARATUS

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Original application May 4, 1936, Serial No. 77,794. Divided and this application May 2, 1938, Serial No. 205,472.

2 Claims. (Cl. 197—53)

The present invention relates to printing telegraph apparatus and particularly to apparatus for recording messages.

This application is a division of application Serial No. 77,794, filed May 4, 1936, and relates more specifically to means for driving the type wheel, in which the type wheel is sleeved upon its shaft and rotation is imparted to the type wheel at a point upon its periphery by means of an arm which is secured to the shaft.

The primary object of the invention is to provide in a type wheel page printer simple and efficient means for effecting the printing operation.

Briefly, the printing telegraph apparatus for which the type wheel in accordance with the invention has been particularly developed, comprises a typing unit removably mounted on a keyboard mechanism which carries a permutation code transmitting mechanism. The typing unit comprises a single magnet selector which is articulated to a permutation code disc selector, the discs of which are adapted to be set permutatively in accordance with signals received by the single magnet selector. When permutatively positioned the code discs select one of a plurality of stop pins and permit it to be positioned in the path of an arm carried by a rotatable shaft, which is motor driven through a friction clutch and on which a type wheel is mounted. The type wheel thus may be stopped in various angular positions in accordance with the selection of stop pins. A rotatable page width paper platen is mounted in alignment with the type wheel in a reciprocable carriage mounted on a foundation portion of the typing unit and arranged to be moved step by step by power mechanism to effect spacing and to be returned to line beginning position by the energy stored in a spring.

The single magnet selector mechanism includes a cam barrel assembly which is frictionally connected to a power driven shaft to be rotated thereby and which controls the operation of the selector mechanism. The last mentioned power driven shaft also includes a set of operating cams mounted on a sleeve or bushing in fixed angular relation with respect to each other and adapted to be driven by the shaft through a positive clutch mechanism in which driving connection is established under the control of the selector cam barrel and which is disengaged automatically at the conclusion of a single revolution of the operating cams. One of the cams is effective to operate a striker member which delivers a blow to a lever to which is connected a print hammer disposed interiorly of the type wheel at the inner end of operating shanks of character carrying elements mounted in the type wheel. The blow which is delivered by the striker member is communicated through the print hammer to the shank of a character element which is thus caused to be reciprocated toward the printing platen. Another cam included in the operating cam assembly operates carriage spacing mechanism and also performs certain necessary stunts or functions. A third cam operates a transfer bail through the medium of which a selection established in the single magnet selector as a result of the reception of a code combination is transferred to the discs of the code disc selector through the articulation between the two selector mechanisms.

The type wheel comprises a radially slotted annular member which receives and slidably supports the shanks of type pallets having flat faces disposed about the periphery of the annular member. Type character elements are carried by the type pallet faces. The type pallets are arranged in two annular rows and the shanks of all pallets in a row are similarly notched to receive a tension spring which biases the type pallets to their innermost positions. A cover to which the hub of the type wheel is secured is clamped by screws to the annular member and closes the tops of the slots therein. A floating ring prevents accidental escapement of any of the type pallets from the slotted member.

For a detailed description of the structure and operation of the various elements, units, and combinations included in the typing unit, reference should be had to copending application of Albert H. Reiber, Serial No. 77,796, filed May 4, 1936, in which the entire printing telegraph mechanism is disclosed in greater detail.

For a complete understanding of the present invention, reference may be had to the following description, in which only as much of the details of the typing unit as is necessary to afford a complete understanding of the invention has been included, taken in connection with the accompanying drawings in which:

Fig. 1 is a perspective view of the printing telegraph apparatus described in detail in the aforementioned copending application and including the type wheel which constitutes the present invention;

Fig. 2 is an exploded perspective view of the type wheel assembly;

Fig. 3 is a plan view, partly in section, of the type wheel assembly and related apparatus;

Fig. 4 is a vertical sectional view through the type wheel and related apparatus; and

Figs. 5, 6 and 7 are perspective views of type pallets.

Referring now to the drawings, in which corresponding reference numerals indicate identical parts in several views, and particularly to Fig. 1, the reference numeral 11 designates generally a keyboard transmitter mechanism. For a detailed description of a keyboard transmitter mechanism which may be employed as a part of the printing telegraph apparatus to be described herein, reference may be had to United States Patent No. 1,595,472, granted August 10, 1926, to Howard L. Krum. In general, the keyboard transmitter mechanism 11 comprises a base casting 12 which pivotally supports at 13 a plurality of key levers 14. The key levers 14 control the positioning of code bars (not shown) which correspond in number to the selecting impulses in the particular transmitting code which may be employed and to each of which is articulated a lever 16 extending upwardly from within the base casting 12.

A transmitting cam shaft 17 is rotatably mounted in bearing supports 18 carried by the base casting 12 and has fixed thereto a gear 19 which is driven by a gear train comprising the gears 21 and 22 from a gear 23, the drive for which will be described later. The gear 19 has connected thereto the driving portion of a tooth clutch 24, the driven portion of which is connected to a cam sleeve 26. The driven portion of clutch 24 is urged by spring thrust into engagement with the driving portion and is normally restrained from engagement therewith by a clutch throw-out lever 27 which is withdrawn from restraining engagement with the driven portion of the clutch, by linkage not completely shown, when any one of the key levers 14 is actuated.

The cam sleeve 26 carries a plurality of transmitting cams 28 each of which includes a notch 29. A transmitting bell crank lever 31 is pivotally mounted in alignment with each of the cams 28 and each lever 31 has an arm (not shown) which carries a cam follower (also not shown) for following the particular cam 28 with which the lever is aligned. The cam follower of each of the transmitting bell crank levers 31 tends to drop into the notch 29 in its associated cam when the notch is presented to the follower but the pivoted levers 16 are effective when they occupy certain positions to block the cam follower arms of the bell crank levers 31 to prevent the cam followers from dropping into the notches 29. It will thus be apparent that as the cams 28 rotate, certain of the bell crank levers 31 will be permitted to rock and others will be restrained by the levers 16 and the rocking or non-rocking condition of the levers 31 will depend upon the permutative setting of the levers 16. The notches 29 in the several cams 28 are displaced from each other so as to be aligned helically, with the result that the bell crank levers 31 are released successively as the cams execute one revolution.

Transmitting contacts 32 are associated with each of the transmitting bell crank levers 31, so that electrical contact is established when a bell crank lever is rocked and an open circuit condition is maintained when a bell crank lever 31 is restrained from being rocked. The electrical contacts 32 may be connected to a telegraph line and to the selector magnet of the typing unit to be described hereinafter, so that marking and spacing impulses may be set up by the several contacts 32 in accordance with the positioning of the levers 16. A knife edge 33 is carried by a pivoted bail 34 which has an arm 36 provided at its outer end with a follower roller 37 which follows a cam 38 carried by the cam sleeve 26. The knife edge 33 drops into blocking engagement with lugs 39 carried by the levers 16 when the cam barrel 26 rotates, to prevent accidental shifting of the levers 16 while a code combination is being transmitted.

The typing unit or receiving portion is designated generally by the reference numeral 41 and is removably mounted on the base casting 12 by suitable bolts, not shown. The foundation of the tpying unit 41 consists of two castings upon which all of the receiving mechanism is mounted. One of the castings is designated 42 and extends from front to rear of the base casting 12 substantially parallel with the transmitting cam shaft 17. The other casting designated 43, is also mounted on the base casting 12 and extends across the base casting 12 near the rear end thereof, substantially at right angles to the casting 42.

The casting 42 has secured thereto, bearing blocks 46 in which is rotatably mounted a vertical shaft which carries previously mentioned gear 23 and other mechanisms to be identified later. The gear 23 is fixed to the vertical shaft and is arranged to be continuously driven from the rotor shaft of an operating motor not shown. It will be noted that no reference character has been applied to the shaft upon which the gear 23 is mounted, the reason for this being that in Fig. 1 the shaft is concealed by the various elements mounted upon it. In addition to the gear 23 by which it is driven, the unseen shaft has fixed thereto the driving portion 47 of a tooth clutch 48 and the spaced discs 49.

The discs 49 are adapted to drive a selector cam barrel 51 which is provided at its opposite ends with discs 52. Friction discs 53 are disposed between the discs 49 and 52, and the cam barrel 51, discs 52, and friction discs 53 are confined between discs 49 under pressure so that the cam barrel 51 when not under restraint is rotated by the discs 49 fixed to the unseen shaft.

The cam barrel 51 constitutes an element of a single magnet selector indicated generally by the reference numeral 56. The selector mechanism 56 may be constructed in accordance with the teachings of United States Patent No. 1,937,376 granted November 28, 1933, to Walter J. Zenner. The selector mechanism 56 comprises a plate 57 mounted on the casting 42 and having an aperture 58 through which the selector cam barrel 51 extends. The plate 57 has mounted thereon a selector magnet 59 to which incoming signal impulses are applied and which, with the cooperation of the cam barrel 51 having helically arranged cam projections 61, effects the setting of a selector lever 62 in the manner described in the above-identified Walter J. Zenner patent. The selector lever 62 controls the operation of a sword-and-T lever selector assembly 63, also completely described in said Walter J. Zenner patent, to effect the permutative setting of lever arms 64 in accordance with impulses applied to the selector magnet 59.

The lever arms 64 are provided at their outer ends with prongs 66 between which are confined disc-like portions 67 of transfer bell crank levers 68. The bell crank levers 68 are pivotally mounted

at 69 and are provided at the outer ends of their arms 71 with disc-like portions 72 disposed in notches formed in permutation code discs of a permutation code disc selector indicated generally by the reference numeral 73.

The code disc selector may be of the type disclosed in United States Patent No. 1,821,110 granted September 1, 1931, to Sterling Morton et al., to which reference may be had for a detailed description of such selectors. The selector comprises upper and lower spaced discs 76 and 77 respectively, which have a plurality of open slots 78 radially arranged. The slots in the disc 77 are concealed, in Fig. 1, by selectable stop pins 79 extending from the lower disc 77 to the upper disc 76. The stop pins are formed with loops 81 at their lower ends disposed in the slots in the disc 77, and a garter spring 82 surrounds the pins 79 just above their loop portions 81 and maintains them in their proper positions. The pins 79 are of sufficient length to extend above the upper disc 76.

Below the upper disc 76 are rotatably mounted a plurality of code discs 75 (Fig. 4) individually aligned with the transfer levers 68 and provided, as previously stated, with notches which receive the disc-like portions 72 of transfer bell crank lever arms 71. The code discs are provided with permutation code notches in the peripheries thereof, so that for each permutative setting of the code discs one complete alignment of notches shall be effected. When an alignment of code notches is thus effected, such alignment is presented opposite one of the selectable stop pins 79, which pivots about its point of engagement with the disc 77, thus moving its upper end inwardly within one of the notches 78 and into the path of a stop arm 83 fixed to a shaft 84 rotatably mounted coaxially of the code disc selector mechanism 73. The shaft 84 is kept under constant torque from the previously mentioned driving motor (not shown) through a friction clutch and suitable gearing (also not shown). When one of the stop pins 79 enters the path of the stop arm 83, the latter rotates into engagement with the selected pin 79 and is thereby stopped to present a selected portion of a type wheel 86, the structural details of which will be described later, carried by shaft 84 near the top thereof and driven therefrom, to a rotatable printing platen 87 carried by a carriage 88. The carriage 88 is reciprocably mounted at the top of frame casting 43 and is urged to its right-hand position by a carriage return spring contained within a drum 89 which is engaged by one end of a belt 91, the other end of which is connected to carriage 88. Suitable mechanisms for spacing the carriage and for performing line feed and carriage return operations are provided and although not shown herein, are completely shown and described in the above-mentioned copending application.

Above the code disc selector 73 and adjacent to the type wheel 86 is disposed a feed mechanism for an inked printing ribbon, such as the inked ribbons employed in typewriters. The feed mechanism includes a plate 92, removably supported above the code disc selector mechanism, which rotatably supports pins 93. The pins have secured thereto, below the plate 92, feed ratchets 94, and above the plate 92 means (not shown) for engaging and driving the ribbon spools 96 mounted on the pins 93. The plate 92 has pivotally mounted thereon a lever 97 which has at its left-hand end a pivot pin 98 on which is pivotally mounted a ratchet feed pawl 99 which is adapted to engage either of the ratchets 94, depending upon the direction in which the ribbon is to be fed, and rotate the ratchet, as the lever 97 is rocked clockwise, to wind the ribbon on one spool, drawing it from the other spool. The right-hand end of operating lever 97 enters a slot 101 in a link 102 which is pivotally mounted at 103 on a power actuated lever 106 pivotally mounted at 107 to a bracket 108 secured to the frame casting 42.

Referring again to the tooth clutch 48, which is carried by the selected cam barrel shaft, the driven portion 111 is spring urged by spring 112 toward the driving portion 47 and is restrained from engagement therewith by a clutch throwout lever 113 pivotally mounted on a shaft 114. Connected to the clutch throwout lever 113 is a lever arm 116 disposed adjacent to the cam barrel 51 to be actuated by a cam projection thereon to effect withdrawal of the throwout lever from restraining engagement with the driven portion 111 of the clutch 48.

The driven portion 111 of the tooth clutch 48 is connected to drive a sleeve 117 which has fixed thereto cams 118 and 119. Cam 118 is engaged by a cam follower roller 121 carried by a lever 122 pivotally mounted on shaft 123. Lever 124 also pivotally mounted on shaft 123 is connected at 125 to cam follower lever 122, and engages the ribbon feed mechanism operating lever 106 to impart counterclockwise rotation thereto when levers 122 and 124 are rotated counterclockwise by the action of cam 118 on cam follower 121. Lever 124 carries pivot pin 126 to which are articulated function performing bars 127 and carriage spacing pawl 128.

Above the cam 118 is box cam 119 which is provided with cam groove 129. Pivotally mounted on shaft 123 is a lever 131 which has a cam follower (not shown) disposed in the groove 129 in cam 119 to be actuated by an offset (not shown) therein. Lever 131 is arranged to be rotated counterclockwise by cam 119, and has articulated thereto a reciprocable bar 132 which is provided with an abutment 133. A striker member 134 pivotally mounted at 136 has an arm 137 disposed in the path of abutment 133.

In Fig. 2 is shown an exploded view of the type wheel assembly 86. The foundation of the assembly is an annulus 141 having a groove 142 of constant depth and rectangular cross section in the periphery thereof, whereby upper and lower integral flanges 143 and 144 are provided. It will be apparent that the foundation might be constructed by securing, by any desired means, flat rings to the top and bottom of an annulus having a circumference equal to that at the base of groove 142, whereby the flat rings would constitute flanges defining a groove. However, in the embodiment shown in Figs. 2 and 4, the flanges are produced by forming the peripheral groove in an annulus having an outside diameter equal to that of the flanges 143 and 144. Radial slots 146 are cut through the upper flange 143, through the annular wall at the base of the groove 142, and partially through the lower flange 144. The slots 146 equal in number the possible permutation code combinations in the code upon which the transmitting and receiving mechanism shown in Fig. 1 is intended to operate, and they are uniformly spaced throughout all but a small angular portion of the member 141. In the small angular portion which is not slotted, the flanges are provided with a rectangular recess or keyway 147. In radial alignment with the recess 147 the flange

143 is provided with a cylindrical aperture 148 extending therethrough. The flange 144 is provided in the upper face thereof with a cylindrical recess 149 coaxial with the aperture 148. The slotted flange 143 is provided with tapped holes 151.

The slots 146 are intended to receive and slidably support and guide type pallets 152, 163 and 203 shown in Figs. 2 to 7. As shown in Fig. 7, the type pallet 152 comprises a type carrying face 153 from the rear of which extends a thin flat shank 154. The shank 154 enters one of the slots 146 and is guided in the vertical portion at the base of the groove 42 as well as in the horizontal portion in the flange 144. Each of the type pallets 152 which is adapted to seat at the bottom of a slot 146 is provided at the top of the shank thereof with a notch 156, and a coiled wire tension spring 157 seats in the recesses 156 and extends around all the shanks 154 of the type pallets 152 and has hooks 158 at the ends thereof engaging a cylindrical retaining pin 159, which is inserted in the grooved annulus 141 through the cylindrical aperture 148 in flange 143 thereof, and which seats in the cylindrical recess 149 in flange 144 as shown in Fig. 4. The relationship between the depth of the groove 142 and the distance of the inner end of type pallet shank notch 156 from the inner surface of the type carrying face 153 is such that the notch 156 is entirely within the groove 142 even when the inner surface of the face 153 abuts the flange 144. It will be apparent from this that the spring 157 is seated in the notches 156 within the groove 142 and urges the type pallets inwardly radially of the grooved annulus 141 so that the inner surfaces of type carrying faces 153 are urged into abutment with the flange 144. It may be observed, by reference to Fig. 3, that the type pallet shanks 154 are of sufficient length to extend interiorly of the annulus 141.

Directly above the spring 157 there is disposed a split ring 161 which rests on the spring 157 and is of sufficient thickness to extend above the upper edge of the shank 154 a distance equal to the extent to which the ring enters the notch 156 therein. The periphery of the ring 161 is disposed adjacent to the shoulder 162 in the shank of each of the type pallets 152. The ring 161 extends outside of the pin 159 and rests loosely or floatingly upon the spring 157 and within the notches 156 in the type pallet shanks 154.

Above each of the type pallets 152 there is disposed in the slots 146 a type pallet 163 similar to the type pallets 152 except that the type faces 164 carry different characters than do the type faces 153, and the notches 166 in the shanks 167 open downwardly instead of upwardly. A spring 168 similar to the spring 157 and similarly engaging the pin 159 is seated in the notches 166 in the type pallet shanks 167 and urges the inner surfaces of the type carrying faces 164 into engagement with the flange 143. The spring 168 presses downwardly upon the split ring 161 and retains it centered within the groove 142 of annulus 141. The shanks of type pallets 163 rest upon the shanks of pallets 152 and since, as previously stated, the ring 161 is of sufficient thickness to extend above the upper edge of the type pallet shank 154, it manifestly extends into the notch 166 in shank 167 of type pallet 163.

A cover 171 for the grooved annulus 141 has an aperture in the center thereof which receives the upper end of a hub member 172 which is fixed to the cover 171 in any convenient manner such as by upsetting as shown at 173 in Fig. 4. The cover 171 is provided on the lower surface thereof with radially extending ribs 174, equaling in width the slots 146 in annulus 141 and spaced in accordance with the spacing of such slots. At one point in its periphery the cover 171 is provided with a recess or keyway 176 corresponding to the recesses or keyways 147 in the flanges 143 and 144. The cover 171 is adapted to seat on the upper face of flange 143 with the ribs 174 entering the slots 146 and with the recess or keyway 176 in alignment with the keyways 147. Clamping screws 177 enter apertures 178 in the cover 171 and engage the threaded apertures 151 in flange 143 of annulus 141 to clamp the cover 171 securely to the flange 143.

In this way a type wheel assembly is provided in which, as shown in Figs. 3 and 4, individual type pallets arranged in rows about the periphery of the type wheel are retained in slots by springs 157 and 168, by split ring 161 and by cover 171. Sufficient clearance is provided between the ribs 174 and the type pallets 163 to provide freedom of the pallets 152 and 163 for sliding movement radially of the type wheel and within the slots of the annulus 141 thereof, within the limits afforded by the annular retaining ring 161. The springs 157 and 168 urge the type pallets to their innermost positions and the floating ring 161 prevents accidental displacement of the type pallets from the type wheel structure in the event that one of the tension springs should become broken and no longer maintain the type pallets under tension.

As shown in Fig. 4, the type wheel shaft 84 is provided at its upper end with a reduced portion 181 whereby there is provided a shoulder 182. The hub 172 is adapted to be mounted upon the reduced portion 181 of the type wheel shaft 184 with sufficient freedom to be slidable with respect thereto and to seat, in its lowermost position, against the shoulder 182. An arm 183 is keyed to the type wheel shaft 84 at the upper end thereof and the arm 183 supports an arm 184 which is provided with slots 186 through which pass clamping screws 187 which threadedly engage the arm 183 and thus adjustably clamp arm 184 to arm 183. Arm 184 is provided at its outer end with depending arm 188 which enters the recesses or keyways 176 and 147 in the cover 171 and annulus 141 respectively. The arms 183, 184, and 188 serve as driving connection between the type wheel shaft 84 and the type wheel 86.

A print hammer 191 is pivotally mounted at 192 above the code disc selector 73 between the type wheel shaft 84 and the platen 87 and facing the latter. The print hammer 191 has integral therewith a bail member 193 which extends rightwardly from the print hammer 191, as viewed in Fig. 3, and has integral therewith at the right-hand end thereof an operating lever 194 (Figs. 1 and 3) pivotally mounted at 196 coaxially with respect to the pivotal mounting 192. The lever 194 carries a resilient impact receiving member 197 (Figs. 1 and 3) which is disposed in the path of the outer end of striker member 134. The impact receiving member 197 is adapted to be struck a sharp blow by the striker member 134, when the latter is operated, to rotate the lever 194 clockwise, as shown in Fig. 1, and thus rotate the print hammer 191 clockwise, as viewed in Fig. 4, to reciprocate the type pallet then in alignment with the print hammer 191 to effect printing by cooperation be-

tween the platen 87 and the type face of one of the type pallets 152 or 163.

It will be observed that in Fig. 4, a type pallet 163 of the upper row of type pallets is aligned with the print hammer 191 and the printing position of the platen, due to the fact that the hub 172 which supports the type wheel 86 is in its lowermost position. At its lower end, the hub 182 is engaged by a horizontal arm 198 of a shifter frame 199 located at the right side of the typing unit (Fig. 1) and arranged to be lifted and lowered by the operation of shift bell cranks 201 and 202 through connections fully described in the hereinbefore mentioned copending application. When the shifter frame 199 is lifted by the operation of the bell crank lever 201, the type pallets 152 in the lower row are brought into alignment with the head of print hammer 191 and in alignment with the printing position of platen 87. Manifestly any type pallet in either row may be brought into operative alignment with the print hammer by shifting the type wheel to the proper level and stopping the type wheel in a particular position as determined by the cooperation of the stop arm 83 with a particular selectable stop pin 79. When the type wheel is shifted upwardly or downwardly on the shaft 84, the keyway recesses 147 and 176 slide on type wheel driving arm 188.

It will be noted that there is shown in Fig. 6 a type pallet differing from those shown in Figs. 5 and 7 in that the face thereof carries no character by which printing can be effected and the shank thereof is shorter than the shanks 154 and 167. The blank or dummy pallets 203 shown in Figs. 3 and 6 are employed in those stop positions of the type wheel at which the printing of a character is not desired; for example, functions such as "shift," "unshift," "carriage return," "line feed," etc., are functions which must be performed under certain operating conditions and it is usually not desirable to print characters when such functions are performed. It is fully set forth in the copending application that the code disc selector 73 selects a stop pin 79 for functions as well as for characters and that the type wheel is brought to a stop at certain positions corresponding to the function selections. In order that printing may be avoided when the function is performed, the short shanked pallets 203 are provided, which the print hammer 191 will not reciprocate a sufficient distance to bring the pallet into cooperation with the platen 87 and which carries no character to be recorded. With this arrangement it is not necessary to disable the striker member 134, the lever 194, or the print hammer 191 when a function is performed.

Referring particularly to Fig. 1 for a description of the operation of the typing unit 41, attention is directed first to the selector mechanism 56, the selector magnet 59 of which receives signaling impulses from a suitable telegraph circuit and with the cooperation of cam barrel 51, which is released for rotation at the beginning of each group of code impulses, sets the sword-and-T selector mechanism 63 by means of the selector lever 62. The setting of T-levers 64 in accordance with received code impulses is transmitted to the code discs 75, through the transfer levers 68, and a particular stop pin 79 corresponding to the code signal received by the selector magnet 59 enters the path of type wheel stop arm 83. Type wheel shaft 84 is permitted to rotate until it is stopped by engagement of the stop arm 83 with the selected stop pin 79. In this manner a particular type pallet 152 or 163, depending upon the previously established shift or unshift condition of the type wheel, is brought into operative alignment with the print hammer 191.

At a predetermined point in the cycle of operation of the selector cam barrel 51, the clutch throwout lever 113 is tripped by lever 116 and cam sleeve 117 is set in rotation. The sleeve 117 imparts rotation to the cams 119 and 118. As cam 119 rotates, its follower (not shown) is operated to cause counterclockwise rocking of lever 131 to which is articulated bar 132. Abutment 133 carried by bar 132 rotates striker member 134 counterclockwise through its engagement with lever arm 137 thereof, and thus a sharp blow is imparted to impact receiving member 197. The blow is transmitted through lever 194, bail 193, and print hammer 191 to the particular type pallet which is aligned with the hammer to cause it to be propelled toward the printing platen 87 to effect printing on paper which may be carried by the platen. The character printing movement of the type pallets 152 or 163 is effected in opposition to their retaining springs 157 or 168 which are operative after printing of the character has been effected to restore the type pallets to their unoperated positions in abutment with the flanges 143 and 144.

In the event that the selected stop pin 79 corresponds to a function to be performed instead of to a character to be printed, one of the dummy type pallets 203 may be aligned with the print hammer 191 in the stop position of the type wheel 86, and since the dummy pallet 203 carries no printing element, and since its shank is shorter than those of the character carrying type pallets, it will not be actuated to produce any marking upon the paper carried by the printing platen.

It should be noted particularly that by means of the type wheel structure described herein, including the individual type elements, great flexibility of arrangement is afforded. The character printing elements may be arranged in any desired order in either the upper or the lower position to permit the association of any desired characters with particular code selections. Thus, printing units as shown in Fig. 1 may be manufactured in accordance with a single standard and may be suited to individual requirements by providing type wheels having the type pallets arranged in accordance with such individual requirements. Also a typing unit which has been individualized by being provided with a type wheel having a particular arrangement of type pallets may be readily converted to conform to a different standard merely by rearranging the type pallets within the type wheel structure or by substituting other type pallets.

It will be understood that the invention is not limited to the provision of dummy type pallets as shown in Fig. 6 in those positions which correspond to function selections. It may, under certain circumstances, be desirable to effect the printing of a character simultaneously with a performance of a function in order that there may be permanent record of the performance of that function and in such cases type pallets in accordance with Figs. 5 or 7 and provided with any desired symbol may be employed.

The springs 157 and 168 engage all of the type pallets in the particular set with which each is

associated, and thus yieldingly retain all of the type pallets in the set under uniform tension. The floating ring 161 is provided as a safety feature to prevent escape of the type pallets from the annulus 141 and scattering of the pallets due to centrifugal force should breakage of either of the springs 167 or 168 occur.

Although a particular embodiment of the invention has been described herein, it will be understood that the apparatus is capable of many modifications and substitutions in the various elements and combinations thereof within the scope of the appended claims.

What is claimed is:

1. In a printing telegraph apparatus, a vertical shaft subjected to a constant torque, the upper portion of said shaft being reduced in diameter to produce a supporting shoulder, a type wheel comprising a hub portion slidable on said upper portion and adapted under certain operating conditions to rest on said shoulder, a disc portion secured to the upper end of said hub, an annulus depending from said disc, said annulus having a groove of constant depth and rectangular cross-section in the periphery thereof whereby upper and lower integral flanges are provided, type pallets slidable in radial slots in said annulus and arranged in two rows, printing means cooperating with the inner ends of said type pallets, aligned keyways in the peripheries of said disc and said upper and lower flanges of said annulus, and an arm secured to the upper end of said shaft, said arm having at its outer extremity a depending portion adapted to be slidably articulated to said type wheel through the instrumentality of said keyways, so that said depending portion is prevented from interfering with the operation of said type pallets by said printing means.

2. In a printing telegraph apparatus, a vertical shaft subjected to a constant torque, the upper portion of said shaft being reduced in diameter to produce a supporting shoulder, a type wheel comprising a hub portion slidable on said upper portion and adapted under certain operating conditions to rest on said shoulder, a disc portion secured to the upper end of said hub, an annulus depending from said disc, said annulus having a groove of constant depth and rectangular cross-section in the periphery thereof whereby upper and lower integral flanges are provided, type pallets slidable in radial slots in said annulus and arranged in two rows, printing means cooperating with the inner ends of said type pallets, aligned keyways in the peripheries of said disc and said upper and lower flanges of said annulus, an arm secured to the upper end of said shaft, said arm having at its outer extremity a depending portion adapted to be slidably articulated to said type wheel through the instrumentality of said keyways, so that said depending portion is prevented from interfering with the operation of said type pallets by said printing means, spaced flanges integral with said hub portion at the lower end thereof, and means embracing said hub portion between the spaced flanges thereof cooperable through the articulation between said type wheel and said depending portion for facilitating case shifting movements of said type wheel, whereby interference between said depending portion, printing means and type pallets is prevented.

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