

Aug. 9, 1932.

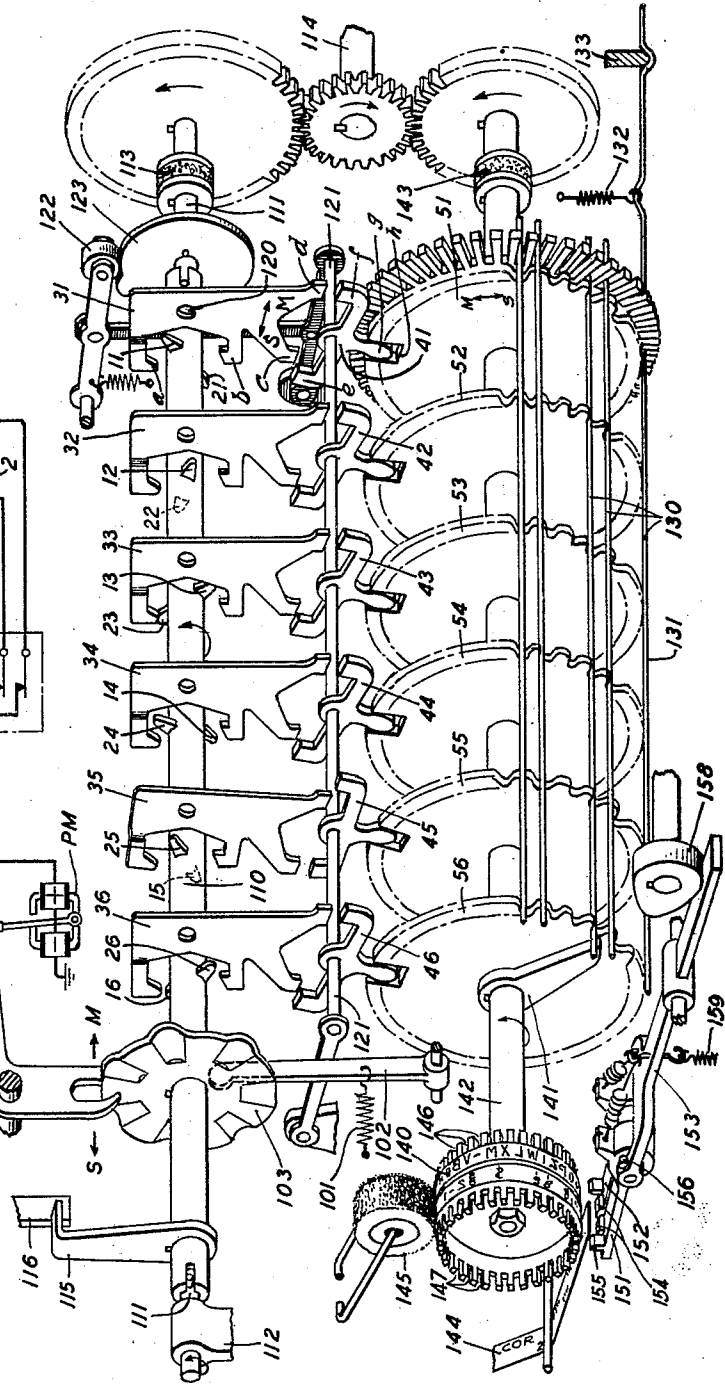
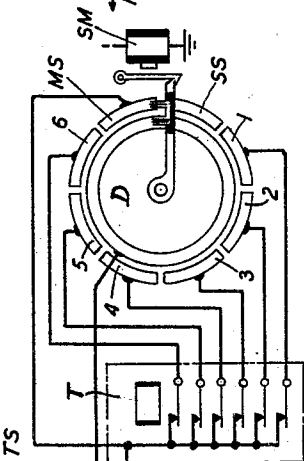
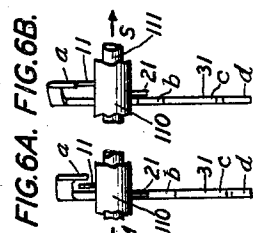
E. F. WATSON  
TELEGRAPH PRINTER

1,870,392

Filed Sept. 1, 1931

2 Sheets-Sheet 1

FIG. 6A. FIG. 6B.



INVENTOR  
E. F. WATSON

BY *J. G. York*

ATTORNEY

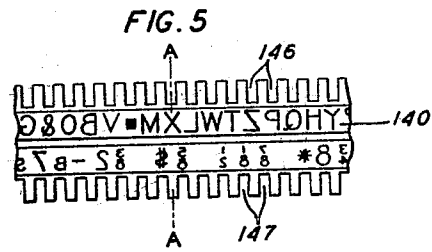
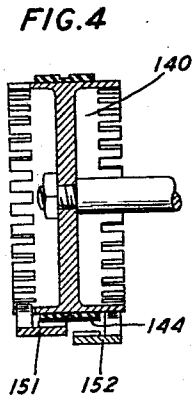
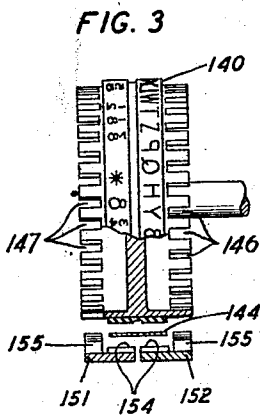
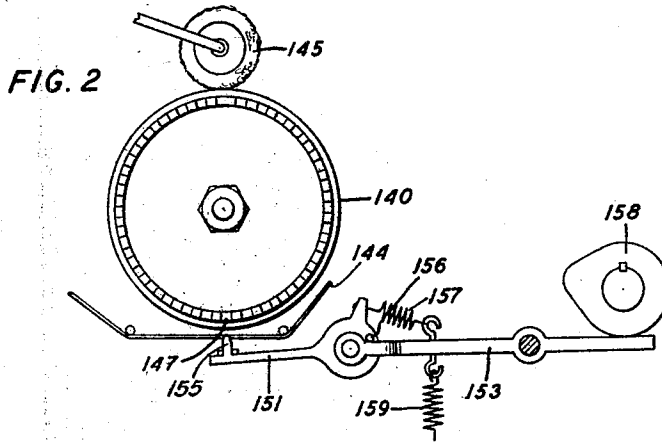
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2 Sheets-Sheet 2



INVENTOR  
E. F. WATSON  
BY *J. C. Moore*  
ATTORNEY

# UNITED STATES PATENT OFFICE

EDWARD F. WATSON, OF LARCHMONT, NEW YORK, ASSIGNOR TO AMERICAN TELEPHONE AND TELEGRAPH COMPANY, A CORPORATION OF NEW YORK

## TELEGRAPH PRINTER

Application filed September 1, 1931. Serial No. 560,631.

This invention relates to telegraph systems and more particularly to telegraph systems including recorders embodying a character type carrier for printing characters in different distinctive manners.

Recorders of this type have a common use in certain telegraph systems, such as circuits for quotation service in which it is desirable to print groups of identifying letters in the upper part of a double line and the corresponding quotations in the lower part.

Systems of this kind have been operated on a five-unit code, i. e., each character, whether of the upper or lower case, has required the transmission of five signal units, in which case it has been necessary, as in ordinary printing telegraph systems, to send a shift signal whenever a shift from one case to the other was desired. It is evident that for quotation service a shift signal would be required, on the average, for every two or three characters transmitted.

It has been proposed to adapt a six-unit code for quotation service, whereby special shift signals would be eliminated with a considerable saving in line time. With such an arrangement it is possible to utilize a single six-unit signal combination for not only selecting a position of the type carrier, but also to determine whether the character is to be printed in the upper portion or the lower portion of the double line.

It is an object of the invention to utilize a signal code for the selection of any one of a plurality of character types arranged in groups on the type carrier of a recording device and at the same time for the differentiation between the characters in the different groups, as by printing such characters in different rows of a multiple line corresponding to those groups, the differentiation between characters depending upon the selected position of the type carrier.

Another object is to provide a telegraph printer capable of utilizing a signal code for the double purpose of selecting characters for printing and of differentiating between groups of characters in which the character types, independent of their code combination, may be distributed in any desired manner in

the different groups without the necessity of altering the signal code or the permutation mechanism of the printer.

A more specific object of the invention is the printing of characters in a double line in response to a six-unit code and the selection of one of two printing hammers responsive to the selected positions of the type wheel.

In accordance with the invention no single unit pulse of the code signals and no single permutation unit of the printer need be allotted any special function involved in the group differentiation between the printer characters, the printing of a selected character in a certain manner being determined solely by differentiating instrumentalities associated with the character and the type carrier. For this purpose any and all of the unit pulses of a signal combination may be used in the selection of a character type by the proper positioning of the type carrier, and due to the selective control by individual means associated with the type and the printing mechanism associated generally with the type carrier, the printing of the type will be performed in a predetermined manner.

Thus, a telegraph printer, when adapted for operation by a six-unit code may have a type wheel with as many as sixty-four different types arranged in two rows on its periphery and the printer is arranged for positioning of the type wheel in sixty-four different positions responsive to six units of selecting mechanism, each adjusted in accordance with a unit impulse of a six-unit signal, which by permutation will provide for 64 different signal combinations. Two printing hammers are provided, one for each row of characters, and the type wheel includes means for permitting only one of the hammers to perform its printing operation for any particular type.

However, in accordance with the invention any other manner of differentiating between the printed character with the necessary mechanism therefor may be arranged and such mechanism controlled by differentiating instrumentalities directly or indirectly associated with the types on the type

carrier and selected simultaneously with the selection of the type.

The invention in its preferred form will be described in connection with the attached drawings in which:

Figure 1 is a schematic representation of a quotation service system of the start-stop type having a common transmitting station and a line including a plurality of receiving stations, and showing in a simplified exploded view only enough of a six-unit character recording device for the understanding of the invention;

Figs. 2, 3 and 4 are detailed views of the type wheel and the printing hammers;

Fig. 5 is a developed view of a portion of the printing face of the type wheel; and

Figs. 6—A and 6—B are views showing the relations between certain elements of a selecting unit of the recording device under marking and spacing conditions, respectively, viewed from the rear of the machine, as shown in Fig. 1.

Inasmuch as the details of the general selecting mechanism, shown in the drawings, do not form a part of the invention, it is believed to be sufficient for a clear understanding of the invention and its operation to describe the operation of this mechanism in conjunction with the detailed description of parts and operations more closely related to the invention.

Referring now to Fig. 1, the line L includes a plurality of receiving relays R, R—1, etc. and a transmitting station TS. The transmitting station TS includes a transmitter T of any known type arranged for a six-unit code, having six transmitting contacts included in the line circuit through a transmitting distributor D of the start-stop type. The line circuit forms a closed loop connecting battery B through the segments of distributor D, contacts of transmitter T, the windings in series of all the relays R and back to battery. When the distributor D is in its stop position, this loop circuit is closed by the brush arm bridging the common ring and the marking segment MS and all the receiving relays are operated to marking position. Transmission is started whenever a circuit, not shown, is closed in a well known manner for the operation of the start magnet SM which releases the brush arm of the distributor. Upon leaving its normal position, the brush arm passes over the spacing segment SS, whereby a spacing signal is transmitted over the loop causing all the receiving relays to release to spacing position. The brush arm thereafter passes over segments 1, 2, 3, 4, 5 and 6 in succession causing the receiving relays to operate in accordance with the combination of open and closed contacts set up in the transmitter T. The brush arm finally comes to a stop on the marking segment MS again closing the loop circuit

and thus completing the transmission of a character.

Referring now to the reception of such a series of permutation signals by any one of the receiving stations, the operation of receiving relay R is transferred to a polarized printer magnet PM, which controls all the operations of the printing device for the selection of a desired character and for the printing of the character either in the upper portion or in the lower portion of a double line on a printing surface, such as a paper tape.

With the printer magnet PM in the marking position, as shown, a spring 101, exerting a pull on pivoted lever 102, applies a pressure to the left on a flutter disc 103 which in turn causes the horizontal arm 105 of the flutter lever 104 to rest against the armature of the printing magnet PM. When the first spacing signal is received, the armature of printing magnet PM moves to the right thereby removing the stop for the arm 105. The flutter disc 103 is fixedly mounted on a cam drum 110, which forms a sleeve, slidably mounted on the selector shaft 111 but arranged to rotate with the shaft; thus, in response to the operation of the printer magnet the flutter disc 103 and with it the cam drum 110 move a distance to the left under the pressure of spring 101 until the left hand end of the cam drum engages the fixed stop 112.

The selector shaft 111 is intermittently driven in a direction shown by the arrow at its left hand end through a friction coupling 113 and proper gearing from a constantly revolving motor shaft 114 connected to a motor, not shown; however, the shaft is prevented from rotating by a stop arm 115 fastened to the cam drum 110 and the free end of which engages a fixed stop 116; when, as described, the cam drum 110 moves to the left the stop arm 115 disengages the stop 116, thus permitting the rotation of shaft 111 and cam drum 110.

The flutter disc 103 has along its periphery a series of corrugations, seven in number, for the purpose of fluttering the lever 104 seven times as the disc makes one revolution, thereby causing the horizontal arm 105 of flutter lever 104 to move up and down; however, when due to the signals, the armature of the printer magnet moves to the left, the downward movement of the arm 105 is prevented and the lever 104 causes the cam drum 110 to flutter in an axial direction on selector shaft 111 due to the interaction between the corrugations in the flutter disc and the prongs of the lower end of lever 104. The speed of rotation of the selector shaft 111 is timed so that each of the seven raised portions or corrugations of the flutter wheel will raise arm 105 once for each unit impulse received over the loop circuit with the result,

that each marking pulse in a signal combination will place the cam drum 110 towards the right for the time of its duration, whereas each spacing pulse will place the cam drum towards the left for the time of its duration. Thus, as the cam drum 110 makes one revolution it will pass through seven periods corresponding to the duration of seven unit impulses and in each period it will be either to the right or to the left depending upon whether the corresponding unit pulse is a marking or a spacing pulse, respectively. Upon the completion of the transmission of an impulse series, the cam drum will have completed a revolution and, due to the marking signal then being placed on the line, the cam drum will move to the right in time for the stop arm 115 to engage the stop 116, thereby bringing the cam drum to a stop.

This fluttering operation of the cam drum 110 during a revolution in unison with received signal pulses is effective in storing up a setting on the selecting or permutation mechanism in the printer in accordance with the impulse combination transmitted. For this purpose the cam drum 110 carries six pairs of cam lugs, namely spacing lugs 11 to 16 and marking lugs 21 to 26, the pairs of lugs being angularly and progressively displaced with respect to each other at a spacing corresponding to the angular spacing between the corrugations in flutter disc 103. Each pair of camming lugs is furthermore aligned in the axial direction with selector levers 31 to 36, which in turn cooperate with transfer levers 41 to 46 for the setting of code discs 51 to 56.

The setting of the code discs from the movements of cam drum 110 will be described only in connection with the first permutation unit, shown at the extreme right, which is responsive to the first impulse of a signal combination received from the line, since the operations for setting the other code discs are the same. In this description reference will also be made to Figs. 6A and 6B which illustrate a portion of the cam drum 110 with the camming lugs 11 and 21 of the first unit and their cooperation with the associated selector lever 31 in the marking and the spacing positions, respectively, of the cam drum 110. The spacing lug 11 is placed diametrically opposite the marking lug 21 on cam drum 110, but these lugs are axially displaced a small distance.

The selector lever 31 has a spacing projection *a* aligned with the lug 11 when the cam drum is in spacing position and a marking projection *b* aligned with the lug 21 when the cam drum 110 is in marking position; the spacing lug 11 will clear both projections *a* and *b* in marking position, and marking lug 21 will clear both projections *a* and *b* in the spacing position of the cam drum. The lugs are shaped to exert a camming

action on these projections to impart a small angular movement to the selector lever 31 about its pivoting point 120, whereby two other projections *c* and *d* on the selector lever 31 are caused to take one of two positions. The projections *c* and *d* cooperate with projections *e* and *f*, respectively, of the transfer lever 41 in such a manner that, in the case of marking, the projection *d* is aligned with projection *f* and projection *c* is out of alignment with projection *e*, whereas, in the case of spacing, projection *c* is aligned with projection *e* and projection *d* is out of alignment with projection *f*. The transfer lever 41 is hinged on a bail 121 which may be raised and lowered through the roller 122 from cam 123 mounted on the selector shaft 111; the transfer lever 41 has a projection *g* fitted into a slot *h* cut into the periphery of the code disc 51 for placing the disc in one of two angular positions, the disc being rotatable about the shaft 142.

During a complete revolution of cam drum 110 the pairs of camming lugs will pass in succession before corresponding projections on the selector levers and due to the fluttering of the drum in response to received signals the lugs will operate the selector levers into their marking or spacing position in accordance with signals received. Shortly before the completion of the revolution the projection on cam 123 will raise the roller 122 for an instant thereby raising the bail 121 carrying all the transfer levers 41 to 46. With the selector lever 31 in marking position as shown in Fig. 1, the projection *d* will be in the upward path of projection *f* of the transfer lever 41, thereby imparting a small angular displacement to the transfer lever, which in turn places the code disc 51 in its marking position; with the selector lever 31 in spacing position the projection *c* would be in the path of projection *e* of the transfer lever thereby placing the code disc in its spacing position. In this manner all the code discs 51 to 56 are adjusted to their spacing or marking positions in accordance with a received signal combination.

Each of the code discs 51 to 56 has a plurality of notches cut into its periphery, and the arrangement of these notches is different in all the discs so that any one of a plurality of stop pins 130 may be selected by corresponding settings of these discs for positioning of the type wheel 140. As shown for one of the stop pins 130 these pins comprise a straight portion 131 which is forced into engagement with the notched periphery of all the code discs by means of a spring 132; the other end of the pin 130 is pivoted at 133.

For each setting of the discs one of the stop pins 130 will be admitted to its inward position, due to the alignment of the notches associated therewith in all the code discs, while all other stop pins will be held out

by a raised portion on at least one of the code discs. The selected stop pin thus enters into the path of the type wheel stop arm 141 together with the type wheel 140 which is mounted on the type wheel shaft 142 driven through friction clutch 143 and gearing from motor shaft 114. The same setting of the code discs, which caused the selective operation of the stop pin 130 referred to, is also instrumental in releasing the stop arm 141 from its previous position in engagement with another stop pin 130 which is forced into its outer position by the camming action of one or more of the notches. The stopping of arm 141 by engagement with the stop pin 130 places a type on type wheel 140 corresponding to the received signal in alignment with one of the printing hammers 151 and 152 ready for printing.

In the past only five code discs have been provided for the selection of stop pins, and for the complete utilization of the possible combinations of the five-unit code thirty-two stop pins have been provided for the stopping of the type wheel in thirty-two different positions. In accordance with the invention the sixth selecting unit associated with the cam drum 110 is made to operate a sixth code disc, which also cooperates in the selection of the stop pins. With this arrangement sixty-four selections are possible and the code discs may be notched for as many as sixty-four stop pins, whereby the type wheel may be stopped in sixty-four different positions.

In the following description of the type wheel and its associated printing hammers, reference will also be made to Figs. 2, 3, 4 and 5.

As shown in Fig. 5, illustrating a developed portion of the printing face of the type wheel in accordance with a preferred form of the invention the characters are arranged in two groups with letters in the upper case and incidentals in the lower case. The paper tape 144 is interposed in the usual manner between the type wheel and the printing hammers 151 and 152 and means (not shown) are provided for advancing the printing tape between each printing operation; the tape is sufficiently wide to permit the printing of the upper case in a line in the upper portion of the tape and of the lower case in a line in the lower portion of the tape as is usual for quotation series. An ink roller 145 engages the types on the wheel 140.

The printing hammer mounting comprises a common lever 153 which carries at its left hand end the two printing hammers 151 and 152, each provided with a platen surface 154 and a guiding projection 155 aligned with the platen surface. The angular relation between the hammers 151 and 152 and the lever 153 is normally maintained, as shown in the drawings, by the engagement of

pins 156 of the hammers with the body portion of lever 153 under the tension of springs 157, this arrangement permitting either of the printing hammers to be held back while the lever 153 and the other printing hammer move forward for the printing of a character. Printing cam 158 is arranged to be driven in unison with the selector shaft 111 by means not shown and to force the printing hammers into engagement with the printing tape and the type wheel against the tension of spring 159 once for each revolution of shaft 111, the timing of this operation being such that it will take place shortly after the type wheel has been positioned for printing.

The type wheel 140 has certain configurations along its periphery which in the preferred form consists of thirty-two guiding notches 146 with intermediate projections or teeth associated with the upper case and thirty-two similar notches 147 and teeth associated with the lower case, adapted to prevent either one of the hammers from printing and to permit the other hammer to print by the placing of a notch in the path of the projection 155 on one of the hammers and the placing of a tooth in the path of the projection 155 on the other hammer. When, for example, a lower case character is selected, the type wheel will be stopped in one of its sixty-four positions whereby a notch 147 will be in alignment with projection 155 on hammer 151; at the same time a tooth between notches 146 will be in the path of projection 155 on hammer 152, so that when both hammers are advanced for printing by cam 158, the hammer 152 will be stopped before its platen surface 154 engages the printing tape and thus will be prevented from printing a character on the upper portion of the printing tape, whereas hammer 151 will not be stopped until its platen surface 154 has brought the printing tape into engagement with the selected type in the lower case, which consequently is printed on the lower portion of the tape; the printing positions of the hammers is shown in Fig. 4. Conversely, when a type in the upper case is selected, its associated notch 146 will admit hammer 152 for printing on the upper portion of the printing tape, whereas a tooth between notches 147 will prevent the hammer 151 from printing in the lower portion of the printing tape.

The projections 155 on hammers 151 and 152 in cooperation with their respective notches 147 and 146 also act to accurately center the selected character type with respect to the platen so that the characters will be printed with a uniform spacing on the paper tape.

It is evident that the arrangement of the hammers and their movements and the means arranged on the hammers and on the type

5 wheel for the selection of one hammer for printing and the prevention of the other from printing may be modified in many ways to serve the same purpose without a departure from the scope of the invention. Thus, 5 either the two sets of notches may be displaced with respect to each other and the cooperating projections on the hammers aligned, or the notches may be aligned and the projections on the hammers displaced; 10 it is also possible to arrange projections or indentations or other forms of alternating selecting configurations for the hammers in a single row so that the projection on one 15 hammer for a given position is aligned with one portion of the row and the projection of the other hammer with an alternate portion of the same row whereby one hammer may be admitted for printing and the other prevented from printing. 20

What is claimed is:

1. A character recording device responsive to permutation signals from a line circuit for printing of characters one at a time in 25 differently aligned portions of a multiple line of print without separate shift operations and shift signals, which comprises a rotating type carrier having a plurality of character types arranged in a plurality of angularly 30 and axially displaced positions, common permutation means for translation of a signal simultaneously into angularly and axially displaced printing positions of said character types, and means for striking a character 35 type selected by said translation for printing in one only of the differently aligned portions of said multiple line as selected by said translation.

2. A character recording device responsive to permutation signals from a line circuit for printing of characters one at a time in two 40 differently aligned portions of a double line of print without separate shift operations or shift signals, which comprises a type carrier having a plurality of character types arranged in a plurality of angularly displaced 45 positions and in two axially displaced positions, common permutation means for translation of a signal simultaneously into angularly and axially displaced printing positions of said character types, and means for striking a character type selected by said translation for printing in either one of the differently aligned portions of said multiple line 50 as selected by said translation.

3. A character recording device and a line circuit for impressing current variations in accordance with a permutation code upon said device, said device being adapted to 60 record characters in a double line of print in accordance with said code without the use of shift signals and said device comprising a rotating type carrier having two rows of character types arranged in a plurality of 65 printing positions, printing means for strik-

ing one type at a time for printing of characters in a double line of print, a plurality of permutation units responsive to said impressed current variations and a plurality of control means individual to said printing 70 positions and adapted to be selected by said plurality of permutation units for determining the printing positions of said type carrier and the row of characters to be presented for printing. 75

4. A character recording device connected to a line circuit and comprising a plurality of selecting units responsive successively to current variations composing a character code signal in said line circuit, an intermittently 80 rotating type carrier, a plurality of type carrier control means individually responsive to the selective setting of all of said selecting units for starting the rotation of said carrier and for stopping said carrier in any one of a 85 plurality of angular printing positions, character types on said carrier aligned for printing in said printing positions and arranged in two rows axially displaced, printing control means adapted to move in unison with 90 said type carrier having configurations of two characteristics corresponding to different printing positions of said type carrier, and printing means adapted for stroking a type aligned for printing in either one of said rows 95 in accordance with the configuration presented by said control means for the selected position of said type carrier.

5. A character recording device in accordance with claim 4 in which said printing control means are integral with said intermittently rotating type carrier. 100

6. A telegraph printer comprising a type carrier having a plurality of printing positions, a plurality of character types on said 105 carrier arranged in two different rows and platen means adapted for striking a type in either one of said two rows for printing on a surface, said type carrier comprising printing control means adapted to cooperate with 110 said platen means for printing only one character at a time, the row in which printing takes place being determined by the configuration of said printing control means corresponding to a selected printing position. 115

7. A telegraph printer in accordance with claim 6 in which said printing control means comprises a plurality of alternating projections and recesses aligned alongside of said rows of character types to cooperate with 120 said platen means for respectively preventing and permitting printing of characters in one of said rows in accordance with a selected printing position.

8. A telegraph printer in accordance with claim 6 in which said platen means comprises a platen surface for covering individual types in one of said rows and another platen surface for covering individual types 125 in the other row for the purpose of printing, 130

one of said surfaces being out of alignment and the other in alignment with a type in their respective rows in any one printing position.

9. A telegraph recorder comprising a type carrier having a plurality of printing positions, a plurality of character types on said carrier arranged in two different rows and spaced sufficiently close to simultaneously present in a printing position at least part of types in both rows for printing, printing means for said two rows of types including two platen surfaces each cooperating with one of said rows of types and means on said type carrier having alternately projecting configurations corresponding to the character types in said rows and cooperating with said printing means to prevent printing in more than one row at a time.

10. In a telegraph printer a rotating type carrier having characters arranged in two groups, two printing hammers, common means for operating said hammers for printing, and selecting means associated with and movable in unison with said type carrier for causing only one hammer to print characters arranged in one of said groups and for causing only the other hammer to print characters in the other of said groups.

11. In a telegraph printer a type wheel having a plurality of printing positions, a plurality of characters on said type wheel arranged in two different lines, the characters in one line being centered in even printing positions only and the characters in the other line being centered in odd printing positions only, platen means for printing said characters in two different alignments on a printing surface, said platen means comprising two yieldably connected printing hammers, and common means for the operation of said hammers, said type wheel having means for selecting one or the other of said printing hammers for printing in accordance with the even or odd position of said type wheel.

12. In a telegraph printer a type wheel having characters arranged in a plurality of printing positions, a plurality of printing hammers aligned for printing of characters in any one of said positions and selecting means associated with and movable in unison with said type wheel for admitting said hammers one at a time for printing in accordance with the selected positions of said type wheel.

13. In a telegraph printer a rotatable type carrier having types arranged in a plurality of groups, a plurality of yieldable printing hammers, common operating means for said hammers and restraining means connected with said type wheel for selecting any one of said hammers for printing in accordance with different angular positions of said type wheel.

14. In a telegraph printer a rotatable type carrier, a plurality of types arranged in two groups on said carrier, a pair of type hammers each adapted to press against the corresponding group of types, means for simultaneously operating both hammers, said hammers being yieldably mounted on said operating means, and selecting means integral with said type wheels for causing one hammer to yield without printing and for permitting the other hammer to print.

15. A telegraph tape printer of the start-stop type for recording on a tape upper and lower case types in two different rows, respectively, of a double printing line in response to six-unit code signals received from a line circuit and without shift signals which comprises a series of six selecting units successively responsive to a code signal, an intermittently rotating type carrier having upper and lower case types arranged in two separate rows, the printing positions of said carrier for the upper case being intermediate those for the lower case, a plurality of carrier control means individually responsive to said six selecting units for positioning said carrier in a plurality of upper and lower case printing positions, two yieldably mounted printing platens, one for the upper case and one for the lower case, each having a guide projection, means for effecting printing engagement between said platens and said type carrier, and means on said type carrier for selection of one or the other platen for printing comprising a plurality of obstructing portions of said carrier for preventing printing engagement between one or the other platen and a type in upper or lower case printing positions, respectively, and also comprising cut-outs between said obstructing portions for registering with said guiding projections to permit an unobstructed platen to come into printing engagement with a type in the lower or upper case, respectively, said cut-outs being aligned with said types of aid in the centering of a selected type with respect to the platen selected for printing.

16. A code signaling system comprising a sending station for the transmission of code signals representing characters grouped in a plurality of different cases, a receiving recorder including a character type carrier having a plurality of printing positions, a plurality of permutation units for selection of printing positions of said type carrier, each unit being responsive to an impulse unit of the code signals, printing mechanism including type striking, coloring and operating means arranged for printing of characters with a plurality of different characteristics corresponding to the plurality of different cases of the transmitted code signals, mechanical control means of different con-

figurations associated with said type carrier  
for controlling said printing mechanism to  
print in any position of said carrier, a char-  
acter with a characteristic determined by the  
5 configuration of said control means associat-  
ed with the position of said type carrier.

In testimony whereof, I have signed my  
name to this specification this 28th day of  
August, 1931.

10 EDWARD F. WATSON.

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