Sept. 14, 1943. E. P. BANCROFT 2,329,580

TELEGRAPH PRINTER

Filed July 25, 1941 2 Sheets-Sheet 1

FIG. 1.

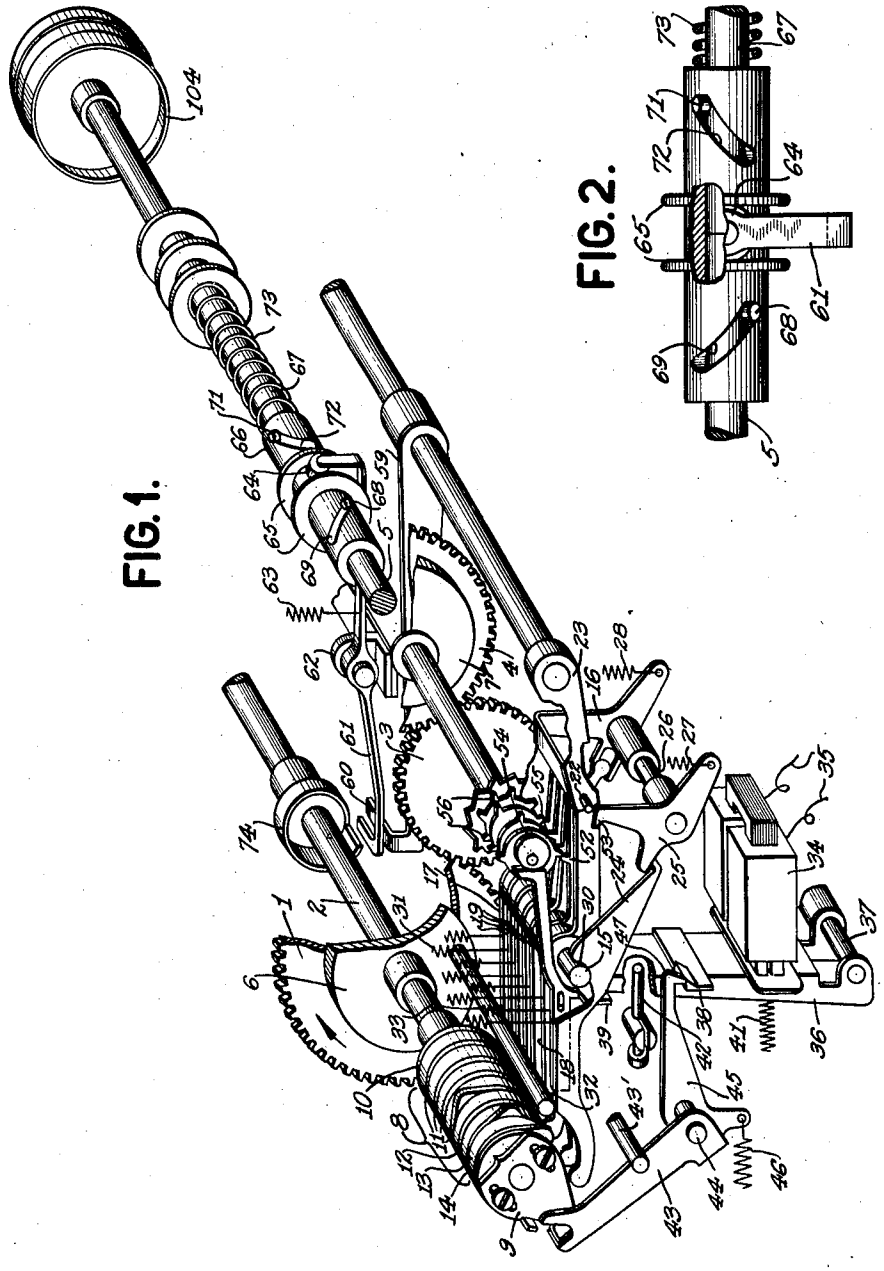


FIG. 2.

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FIG.3.

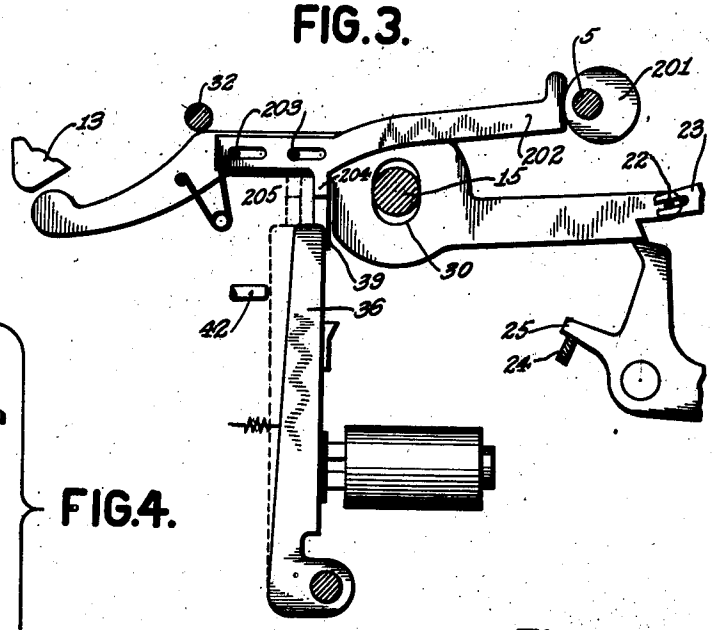


FIG.4.

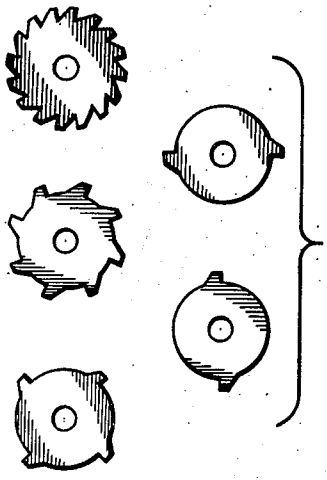


FIG.6.

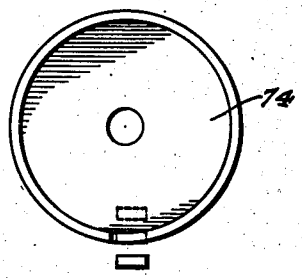


FIG.5.

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UNITED STATES PATENT OFFICE

2,329,580

TELEGRAPH PRINTER

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Application July 25, 1941, Serial No. 404,041

16 Claims. (Cl. 178—34)

This invention relates to rhythmic printing telegraph receivers of the type in which the selections are controlled by permutation code selecting mechanisms.

The mechanism shown and described herein is particularly adapted for use with receivers wherein a type wheel shaft is equipped with stops which progressively control fractional portions of a revolution of the type wheel in successive steps in accordance with received code impulses. It is especially useful where the type wheel is selectively permitted to rotate fractional portions of a revolution such as one-half, one-quarter, one-eighth, and so on.

In printing telegraph receivers of the character referred to, which have been available heretofore, it has been necessary to rotate the type wheel shaft at a speed several times that of the distributor shaft in order to return the latter to a zero starting position following each character selection. In cases where the selected character causes only a small fraction of a revolution of a type wheel shaft, practically a complete revolution must be made in returning the same to its zero starting position. This usually took place during the interval between the completion of one selection and the beginning of the next and therefore had to be done at a high rate of speed in order to arrive at the starting position in time. This rapid rotation of the stop shaft and type wheel produces excessive wear and noise and is generally undesirable.

The principal object of this invention is to provide simple methods wherein the type wheel shaft may be stopped in its starting position in either of two alternative positions substantially 180° apart.

Another object of this invention is to provide means which will permit moving the type wheel shaft to the selected position and returning the same to the starting position at a rate of speed only slightly in excess of that corresponding to the rate of speed of the distributor shaft.

Another object is to provide means whereby that portion of the typewheel shaft controlled by the stop mechanism is never required to rotate as much as one-half revolution either in moving to a selected position, or in returning from a selected position to a starting position.

According to the present invention a half revolution of the type wheel is under control of the first selective impulse and such rotation is accomplished during receipt of the succeeding selective impulses and independently of any additional rotation resulting therefrom.

According to a further feature of the present invention the selective control exercised by the first selective impulse is reversed for alternate characters received. Thus, if on the first character received the first impulse is selective and the type wheel is thereby caused to rotate one-half revolution then, on the next character received, if the first impulse is selective, no rotation will result therefrom.

A further feature of the invention lies in equipping the stop unit on the selector shaft with exactly similar stops on each half of its circumference and in using each half alternately for positioning a type wheel which is coupled thereto on a unity ratio basis for recording alternate characters.

Printing telegraph receivers are known (U. S. Pat. 2,192,353, dated March 5, 1940 to E. E. Kleinschmidt) in which a selector shaft of the type herein disclosed is equipped with duplicate stops on each half of its circumference and in which the two halves of the selector shaft are used alternately for selecting the character to be recorded. The type wheel is geared to the selector shaft on a 2 to 1 ratio basis, and makes a complete revolution for each half revolution of the selector shaft. Accordingly, corresponding stop positions on each half of the selector shaft positions the type wheel in exactly the same angular position. Also, printing telegraph receivers (U. S. Pat. 2,192,354, dated March 5, 1940 to E. E. Kleinschmidt) are known in which the selector shaft is equipped with stops on only one-half of its circumference and in which the type wheel shaft is connected to the selector shaft through a slidable coupling whose operation can cause 180° revolution of the type wheel independent of the rotation of the selector or shaft. In the former case the selector shaft makes a half revolution for each character recorded. In the latter case the selector shaft makes a complete revolution for each character recorded. Again in the first mentioned case the selector shaft rotates only slightly faster than the distributor shaft controlling the same while the type wheel rotates at twice this speed. In the latter case the selector shaft rotates at substantially double the rate of speed of the distributor shaft in order to insure return to the zero starting position from any selected position during the time interval between the completion of one character and the beginning of the next. In each of these receivers these high rates of speed are undesirable and are likely to cause undue wear and noise.

In the present invention both the selector shaft

and the type wheel may be operated at a speed only slightly in excess of the speed of the distributor shaft. Other features of the invention will become apparent in the description which follows, and in the appended claims.

Referring to the drawings:

Fig. 1 shows the apparatus in perspective, all of the framework being eliminated and some of the parts cut away to show the mechanism more clearly.

Fig. 2 is a plan view showing, in detail the cam sleeve for rotating the type wheel.

Fig. 3 is an enlarged detail of the mechanism for controlling the selection of a character group.

Fig. 4 is a detail of the stop cams on the selector shaft.

Fig. 5 is an alternative arrangement for controlling the operation of the sleeve for rotating the type wheel shaft.

Fig. 6 is an end view of a portion of the apparatus shown in Fig. 5, showing the different possible spatial relationships between two elements.

The invention will now be described as applied to a printer similar to that described in the patent to Kleinschmidt, No. 2,192,354, referred to above. A brief description of the mechanism of this printer is thought to be sufficient for an understanding of the invention, the printer being a well known device and is fully described in the patent referred to.

Referring now to Fig. 1, gear 1, loosely mounted on shaft 2, is rotated in a clockwise direction at a constant speed by a motor, not shown, an idler gear 3 connects gear 1 with gear 4, also rotated in a clockwise direction and loosely mounted on shaft 5; gear 1 tends to rotate shaft 2 by a friction coupling 6, and gear 4 tends to rotate shaft 5 by a friction coupling 7. Shaft 2 has fixed on it a cam assembly 8 and an orientable stop member 9. Cam assembly 8 consists of a latch release cam 10, four stop lever cams 11, a normal stop lever cam 12, type wheel shift lever cam 13, and release lever cam 14. Latch release lever 17 rotates on stud 15 and operates latch 16. Four stop levers 19 are mounted on stud 15 and each has an elongated bearing aperture 30, which permits a slight lateral displacement as well as rotation on stud 15. Normal stop lever 18 rotates on stud 15. Type wheel rotating lever 21, also mounted on stud 15, has an elongated bearing aperture the same as stop levers 19 and is connected by pin 22 to the bifurcated end of lever 23. Release lever 24 rotates on stud 15 and bears against latch 25. Latch 16 and latch 25 rotate on stud 26 and are held in their unoperated positions by springs 27 and 28. Springs 31 hold stop levers 18 and 19 against the lower part of stud 15 and stop 32. Spring 33 holds type wheel shift lever 21 against the lower part of stud 15 and stop 32.

A receiving magnet 34 is connected by wires 35 in the circuit of a transmitter not shown. Armature lever 36 has a bearing on stud 37 and has attached to it latch plate 38 and fulcrum plate 39. Armature lever 36 when retracted by spring 41 rests against stop screw 42. A stop lever 43 pivoted on stud 44 lies in the path of stop member 9 and holds shaft 2 against rotation when they are in engagement. Pin 43' limits rotation of stop lever 43. Stop lever 43 has an extension 45 that rests on latch plate 38 when armature lever 36 is attracted, as shown in Fig. 1. When armature lever 36 is released, under a no-current start condition, spring 41 pulls armature 36 to the left against stop 42. In this position hooked end 47 of extension 45 of stop lever 43 is moved off latch plate.

The stop wheel assembly 54 is provided with duplicate stops 55 in each 180° of its circumference, as indicated in Fig. 4 which shows the details of the several stops. Assembly 54 is fixed to shaft 5 and comprises four rows of stop cams, each row of stops doubling in number over the previous row, the first cam having one stop in each half, the next two, the next four, and the last eight. One additional stop 55 is provided with two stops which engage the normal stop lever 18 in either of the two normal stop positions and holds the shaft 5 against rotation as shown in Fig. 1.

When armature lever 36 is moved against stop screw 42 it first releases stop lever 43 from engagement with orientable stop member 9, permitting shaft 2 and cam assembly 8 to rotate, as explained above, cam 13 thereupon operates type wheel rotating lever 21 and thereafter the four cams 11 operate the four stop levers 19 in succession. If armature lever 36 remains against stop 42, levers 21 and 19 will pivot on latch 16, the elongated bearing aperature in the levers permitting them to move vertically without rotation on stud 15. When, however, armature lever 36 is moved to the attracted position away from stop 42, after it has released stop lever 43, fulcrum 39 will be under bearing ledge 51 and if this happens when one of the stop levers 19 is operated by a cam 11, lever 19, will engage fulcrum plate 39 and pivot thereon, forcing its latch extension 53 to move latch 16 outwardly and in doing so latch 16 will release normal stop lever 18, permitting stop finger assembly 54 and shaft 5 to rotate. Stop extension 52 of the operated stop lever 19 will then be in the path of its row of stop fingers forming part of stop wheel 54 and will again stop shaft 5. The operated stop lever 19 will latch on latch 16 and remain there until the next stop lever 19 is operated. Latch extension 53 will then rest on latch 16 and remain there until the next stop lever is operated to fulcrum on fulcrum plate 39 or until latch 16 is operated by latch release cam 10, which occurs at the end of the cycle. By varying the operation of the four stop levers through the action of armature lever 36, stop wheel 54 and shaft 5 can be set in sixteen different positions including the normal stop position.

Following the selection and recording of a character the stop wheel assembly 54 is released by cam 10 which releases latch 16, and continues its rotation under the influence of the friction clutch 7 until it reaches the next normal stop position. As described, sixteen printing positions are determined by the action of the stop wheel assembly 54 whereas the type wheel has thirty-two different printing positions. In order to take care of the extra sixteen printing positions the type wheel may be rotated through 180° under control of one of the selecting impulses (preferably the 1st impulse) independently of the rotation caused by the rotation of the stop wheel assembly. The various parts which make this possible cooperate in the following manner:

Lever 21 connects with shaft 57 through lever 23 which has fixed thereto a lever 59 that terminates in an extension 60. A lever 61 pivoted on a universal bearing 62, is held in contact with the extension 60 of lever 59 by a spring 63. The opposite end of lever 61 is bent upward and carries a roller 64 that is placed between flanges 65

of a sleeve 66 which is slidably and rotatably mounted on shaft 5 and shaft 67, the latter carrying type wheel 104. A pin 68, fast in shaft 5, works in a diagonally placed slot 69 in sleeve 66, and a pin 71, fast in shaft 67, works in a diagonally placed slot 72 in sleeve 66. The slots 69 and 72 are so formed that when sleeve 66 is moved to the right along the shafts 5 and 67 against the tension of spring 73, shaft 67 is rotated 180° with respect to shaft 5. In the operation of the device, shaft 5 is either rotated through the friction clutch 7 or is held stationary by stop 18 or one of the stops 19; shaft 67, being connected to shaft 5 by sleeve 66 and pins 68 and 71, rotates with shaft 5 as well as being rotated under the influence of the sliding motion of sleeve 66. The normal position of sleeve 66 is as shown in Figs. 1 and 2, that is, when it is moved to the left under the influence of spring 73 and when pins 68 and 71 are at the right hand end of slots 69 and 72 respectively. A face cam 74 is fixed to shaft 2 and rotates therewith and lever 61 is engaged by cam 74 when placed in its path by the operation of lever 59.

During the selecting cycle the stop wheel assembly 54 is required to make a maximum of fifteen-thirty-seconds part of a revolution and may make as little as one-thirty-second part of a revolution. Likewise, during the interval between the end of one selecting cycle and the start, that part of the next which controls the assembly 54 the latter must complete the half revolution. Here again, the maximum and minimum angular travel will be fifteen-thirty-seconds and one-thirty-second part of a revolution respectively. It will be observed that the time allowed for the return of the assembly 54 to either of its two normal stop positions consists of the time allotted to the stop pulse plus the start pulse plus the first selecting pulse on three-sevenths of the total time allotted to each character cycle assuming a seven unit character cycle as is common in start-stop printers.

The operations as just described, are well known in the art providing the selector shaft is permitted to make a complete revolution. However, in the instant invention the selector shaft is permitted to make but half a revolution; therefore, it will be observed that the location of any character on the type wheel with respect to the stop position of the selector shaft changes 180° for each alternate character. Thus, if a character—let us say, "A" is in the second half of the circumference of the type wheel with respect to one normal stop tooth, "A" will be in the first half of the circumference of the type wheel with respect to the other normal stop, which is 180° displaced from the first. This same condition holds for each and every character on the type wheel. Unless, therefore, provision is made to take care of this shift in the relative location of the characters with respect to either normal stop position, characters 180° displaced from the desired character would be recorded for each alternate character selection. The parts which cooperate to produce the desired results are shown most clearly in Figs. 1 and 3. Assuming that the independent 180° rotation of the type wheel is under the control of the first selecting element, and further assuming that the desired character is in the second half of the type wheel then the operation of lever 21 must be such as to rotate shaft 57 in clockwise direction, causing lever 61 to cooperate with cam 74 and thereby rotate the type wheel 180° with respect to shaft 5. Assuming now that this same character is to be repeated immediately it will then be found in the first half of the type wheel and response to the first selecting impulse must be such as not to cause lever 61 to cooperate with cam 74. To bring this about there is rigedly mounted on selector shaft 5 an eccentric 201. Cooperating therewith, is a lever 202 which is mounted in slidable relation to lever 21 on pins 203 integral with lever 21. Spring 205 exerts a pressure to push lever 202 to the right, as shown in Fig. 3. Assuming for the first character to be received the selection shaft is in the position shown, lever 202 will be toward the right and in a position whereby extension 204 thereon will cooperate with the armature 36 when the latter is in its operated position. Under this condition lever 21 when operated by the distributor will pivot about extension 204 causing shaft 57 to rotate clockwise and lift lever 61 into engagement with cam 74 thereby causing the rotation of type wheel 104 180° with respect to shaft 5. At the completion of the first character selection shaft 5 will stop in a position 180° removed from the position shown and lever 202 will be forced to the left of the action of eccentric 201. In this position the extension 204 will cooperate with lever 36 only when the latter is in the released position or against stop 42. Thus, if the same character is repeated and armature 36 is attracted to its operated position during the first selecting interval as shown in Fig. 3, lever 21 will pivot about pin 22 leaving shaft 57 in its normal position. Lever 61 will be clear of cam 74 and the type wheel will not be rotated 180° with respect to shaft 5 and the desired character will be selected. It will thus be seen that the same character appears alternately in the second and first half of a circumference of the type wheel with respect to shaft 5 and through the mechanism just described will be correctly recorded regardless of which stop position is used as the starting point for the selecting operation. There is no possibility of getting out of step since the eccentric 201 is rigidly connected to the selector shaft 5.

An alternative method of accomplishing this same result is shown in Fig. 5. When this method is used lever 202 shown in Figs. 1 and 3, is omitted and lever 21 responds in exactly the same manner for each character selected. The desired result is obtained from eccentric 301 rigidly mounted on shaft 5, cooperating with a slidable lever 302 which is normally pulled to the right, Fig. 5, by spring 303. In the positions of the parts shown in Fig. 5, with lever 60 in its normal or unoperated position, lever 61 will be out of engagement with face cam 74. If lever 60 is operated by turning shaft 57 in a clockwise direction lever 61 will be raised into engagement with the face of cam 74 and will cooperate therewith to turn the type wheel 180°. On the succeeding character eccentric 301 will have rotated 180° pushing lever 302 to the left against the tension of spring 303. Through the medium of cam 304 on lever 303 lever 61 will be raised to such a position that when lever 60 is in its unoperated position lever 61 will be in a position to cooperate with the face of cam 74 and thereby to rotate the type wheel 180° with respect to shaft 5. However, when lever 60 is now operated lever 61 will be raised so as to be out of engagement with the face of cam 74 and will ride freely on the inner periphery of this cam during the rotation thereof. It will thus be seen that alternate selecting operations of shaft 5 will produce

the desired results and that in one case the type wheel will be turned 180° when lever 60 is operated and in the next succeeding case it will not be turned 180° when lever 60 is operated.

From the foregoing description, it will be apparent that the type wheel will be positioned to record the proper character in all cases regardless of which of the two normal stop positions is used as a starting point. Likewise, it will be apparent that stop assembly 54 and shaft 5 will be required to make something less than one-half a revolution during each selecting cycle and will have ample time to return to the next normal stop position following the completion of the selecting cycle, and before the commencement of that part of the next cycle which determines the positioning of the stop assembly. It is also apparent that in cases where the type wheel is required to be rotated 180° with respect to shaft 5, that ample time is allowed, both for the positioning of the type wheel and for its return to normal with respect to shaft 5.

No attempt is made herein to describe the method by which the selected characters may be recorded, or how other functions, such as spacing, shift and unshift, etc., may be accomplished, since these operations are clearly described in the two patents already referred to, and since these operations form no part of the present invention.

What is claimed is:

1. In a telegraph printer, a rotary cam shaft having a plurality of cams, a selecting magnet having an armature arranged to be positioned by line signals in selecting or non-selecting position, a plurality of members adapted to be moved into selecting position by said cams and said armature when the latter is in selecting position, type means divided into a plurality of selectable groups, means comprising one of said members for determining the group to be selected, a cam arranged to cooperate with one of the first mentioned cams to vary the operation of the last mentioned member in respect to the position of said armature.

2. In a telegraph printer, a rotary cam shaft having a plurality of cams, a selecting magnet having an armature, a plurality of members adapted to be moved into selecting position through the cooperation of said armature when in selecting position with said cams, type means divided into a plurality of selectable groups, means comprising one of said members for determining the group to be selected, and a cam on a second shaft arranged to cause the last mentioned member to be operated during the selection of alternate letters by a cam on the first mentioned shaft when said armature is in non-selecting position.

3. In a telegraph printer, a rotary camshaft having a plurality of cams, a selecting magnet responsive to line signals having an armature adapted to be positioned by line signals in selecting or non-selecting position, a plurality of members adapted to be moved through the cooperation of said cams and said armature into either selecting or non-selecting position, type means divided into a plurality of selectable groups, means comprising at least one of said members for determining a group to be selected, and a cam on a second shaft arranged to vary the operation of the last mentioned member in respect to the position of said armature.

4. In a telegraph printer in which a typewheel is positioned progressively, a selecting magnet having an armature, a plurality of selectors including selector means effective to select a group of type on said typewheel controlled by said armature, and means rotating in predetermined relation to said typewheel and effective at a predetermined point in the cycle of alternate letters to cooperate with said armature to reverse the operation of said selector means.

5. A start-stop telegraph printer in which a typewheel is positioned by a stop wheel having rows of stops that progressively double in number as to rows, and means for driving said typewheel at a rate substantially within 10% in excess of that of said stop wheel.

6. In a telegraph printer in which a typewheel is positioned progressively, a plurality of selectors, at least one of which determines the selection of a group of type on said typewheel, means rotating in predetermined relation to said typewheel, for reversing the effect of said selector in determining the group of type to be selected.

7. In a telegraph printer having a typewheel, a selecting mechanism arranged to select the character to be printed from one of a plurality of groups of type on said typewheel, a selecting magnet responsive to line signals, an armature therefor for controlling said selecting mechanism, said armature being movable to either a selecting or non-selecting position in accordance with the line signals, and means for causing said armature to be effective to control the selection of a group of characters irrespective of its position.

8. In a telegraph printer having a typewheel, a selecting mechanism arranged to select the character to be printed from one of a plurality of groups of type on said typewheel, a selecting magnet responsive to line signals, an armature therefor for controlling said selecting mechanism, said armature being movable to either a selecting or non-selecting position in accordance with the line signals, and means for causing said armature to be ineffective when in its selecting position.

9. A telegraph printer comprising a selector magnet, an armature therefor adapted to be moved into selecting or non-selecting position, a plurality of members arranged to be selectively controlled by said armature when in selecting position and means effective during the selection of alternate characters to cause said armature to invariably operate at least one of said members if in non-selecting position.

10. A telegraph printer comprising a selector magnet, an armature therefor adapted to be moved into selecting or non-selecting position, a plurality of members arranged to be selectively controlled by said armature when in selecting position and means effective during the selection of alternate characters to cause said armature to invariably operate at least one of said members if in non-selecting position and means for restoring said means so that said members are normally operated for the intervening letters.

11. A telegraph printer comprising a plurality of groups of type, a shift member for selecting a group of type, means for operating said shift member invariably for alternate characters.

12. A telegraph printer comprising a plurality of groups of type, a selector magnet, a shift member, means for operating said shift member invariably for alternating characters, and means controlled by said selector magnet to render said shift member when operated ineffective to cause a shift operation.

13. In a telegraph printer a plurality of selectable members, means for moving said members in succession, a selector magnet having an arma-

ture movable into a selecting or non-selecting position adapted when in the former position to be effective to selectively modify the motion of said members, and means carried by at least one of said members effective at a predetermined point in the printer operating cycle to cause said armature if in its non-selecting position to selectively modify the motion of said member.

14. In a telegraph printer responsive to received signals, a typewheel, a stop wheel having two sets of stops displaced 180° from each other, the respective sets of stops being used to select alternate letters, an adjustable connection between said typewheel and said stop wheel, a selecting mechanism to progressively stop the stop wheel in accordance with received signals, means to revolve the typewheel with respect to the stop wheel under control of one of the units of the code, and means effective when a predetermined one of said sets of stops is in selecting position to reverse the effect of said code unit in controlling said means to revolve the typewheel.

15. In a telegraph printer responsive to received signals, a typewheel, a stop wheel having two sets of stops displaced 180° degrees from each other, the respective stop sets being used to select alternate letters, an adjustable connection between said typewheel and said stop wheel, a selecting mechanism to progressively stop the stop wheel each half revolution in accordance with received signals, means to revolve the typewheel in respect to the stop wheel under control of one of the units of the code, and means comprising a cam effective when a predetermined one of said sets of stops is in selecting position to reverse the effect of said code unit in controlling said means to revolve the typewheel.

16. In a telegraph receiver responsive to a series of signals a stop wheel having two sets of stops on opposite arcs of said wheel, a cam on the shaft of said wheel associated with one of said sets of stops, a set of selector levers arranged to be operated in succession during the selection of a character, a selecting magnet having an armature movable into selecting or non-selecting position, said armature being adapted to act as a fulcrum for said selectors when in selecting position and to thereby modify the motion of said levers, a movable member on one of said levers operated by said cam, said member being displaced when engaged by said cam to cause said armature to act as a fulcrum for said lever when in non-selecting position.

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