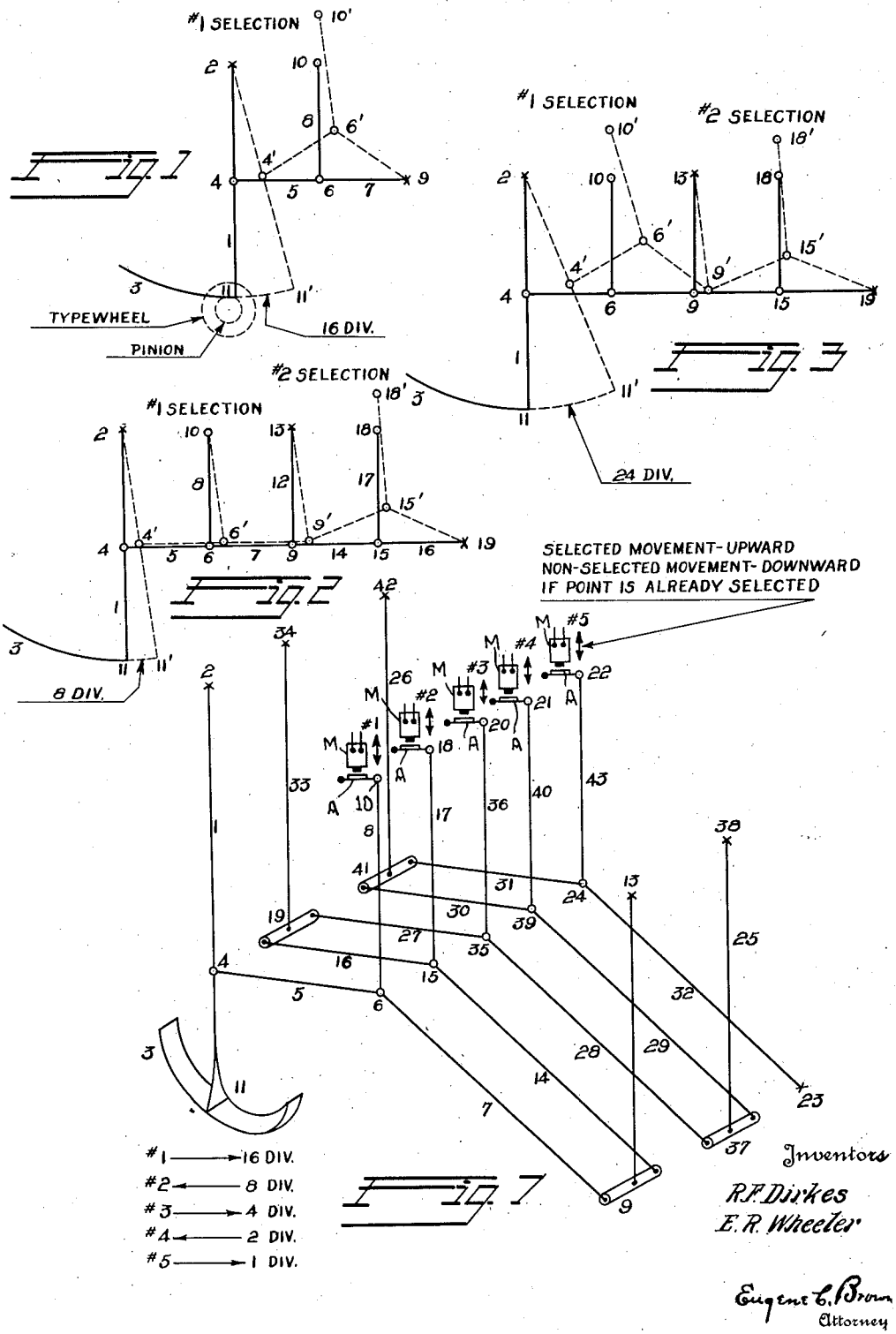
May 21, 1929. E. R. WHEELER ET AL 1,714,334

SELECTING MECHANISM FOR TELEGRAPH TYPE WHEEL PRINTERS

Filed Sept. 9, 1927 2 Sheets-Sheet 1



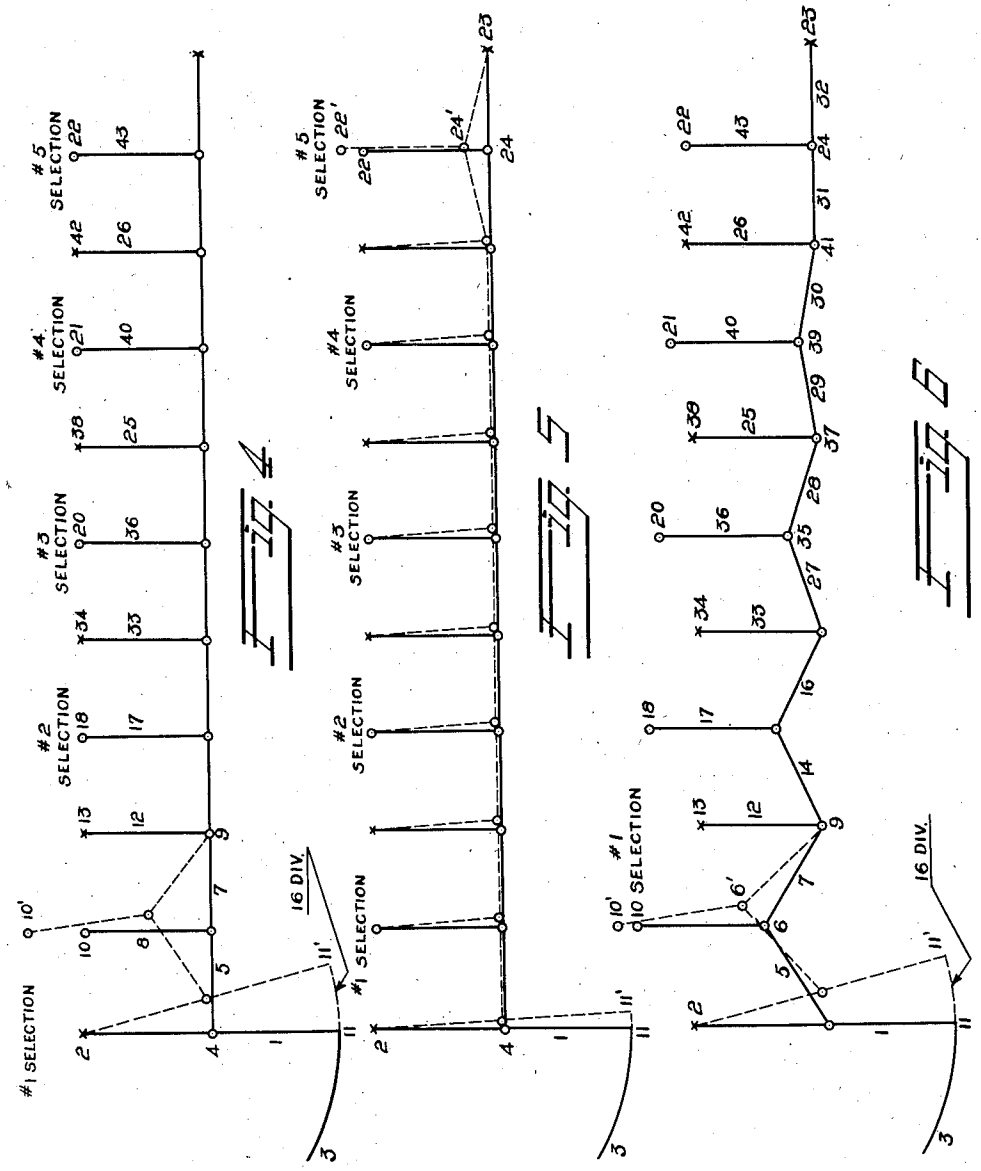
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SELECTING MECHANISM FOR TELEGRAPH TYPE WHEEL PRINTERS

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UNITED STATES PATENT OFFICE.

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SELECTING MECHANISM FOR TELEGRAPH TYPE-WHEEL PRINTERS.

Application filed September 9, 1927. Serial No. 218,540.

This invention relates to printers or tickers in which characters are arranged on a typewheel or a type segment and particularly to the mechanism for rotating the typewheel or segment to bring the desired character on the wheel to the printing position.

An object of our invention is to provide a telegraph printer or ticker capable of a high speed of operation with maximum accuracy and one which is simple and compact in construction and inexpensive to manufacture.

Fundamentally a printer having its characters arranged in the form of a typewheel or on a segment is capable of simpler construction and requires fewer parts than a printer having its characters arranged on typebars as in typewriters or in well known forms of telegraph printers. Characters arranged in typewheel form or on a segment are accordingly chosen for this description.

A printer typewheel may be rotated or positioned for printing by stepping it one character space at a time under the influence of electrical or mechanical means. This results in a slow operation as considerable time is required to step the typewheel to the desired position. A preferred means is to utilize a uniform code, say of five selecting impulses per character, and cause the typewheel to be rotated by the cumulative effect of selecting means controlled by the selecting impulses.

Probably the best known case of the control of a typewheel by cumulative or aggregate movements is that of Buckingham described in Patent No. 487,981 dated December 13, 1892. A recent one is described in Patent No. 1,533,207 of H. Pfannenstiehl dated April 14, 1925. Another arrangement is disclosed in Patent No. 1,613,937 of M. P. Chaplin dated Jan. 11, 1927. The mechanism of the invention disclosed herein also controls the positioning of the typewheel by the cumulative action of members which are separately controlled by the selecting impulses of the code characters but differs in many details from the cumulative action mechanisms previously known.

In the following description we shall refer to the accompanying drawings in which—Figures 1 to 6 inclusive—are diagrammatic illustrations showing the arrangement of link mechanism comprising one embodiment of our invention; and Fig. 7 is a diagrammatic illustration of another embodiment of the same showing a more compact arrangement of the link mechanism.

Referring to Fig. 1, we have shown one unit of the selecting mechanism designated #1 selection, in non-selected and selected positions. Link arm 1 is pivoted at #2 and has affixed to its lower end a segment 3. The characters to be printed may be embossed on this segment if so desired or the segment may be a portion of a gear wheel in which may be meshed a pinion which is fixed solidly on the typewheel shaft. In the first case any motion of the arm 1 about pivot 2 changes the character position directly, while in the second case the movement of arm 1 is imparted through gear teeth and a pinion (shown dotted) to a typewheel. For purposes of this description either method may be employed.

At some point 4 on link arm 1, link 5 is secured in such a manner that it can rotate with point 4 as a pivot. At point 6 the other end of link 5 is secured to links 7 and 8. Links 5, 7 and 8 are independently rotatable about pivot 6. The right hand end of link 7 is shown pivoted at a fixed point 9, while the upper end of link 8 is pivoted at a movable point 10. The full lines in Fig. 1 show this unit of the mechanism in its normal non-selected position. The links are all rotatable in a horizontal plane and no motion can be imparted to it in any other plane because of the nature of the bearings and pivots.

For selection of this one unit, point 10 is moved upwards to a predetermined point 10′. This movement may be accomplished in various ways which it is not our purpose to discuss here. One way is to have point 10 attached to the armature of one of the five selecting magnets such as are commonly employed in telegraph printers, which will impart the desired upward movement when the magnet is energized from one of the incoming selection impulses. When point 10 is displaced to 10′, point 6 is pulled upwards, but because link 7 is pivoted at a fixed point 9, point 6 is compelled to swing to the right to a point 6′. This causes link 5 to be displaced to the right and it in turn pulls link 1 to the right, causing it to rotate about point 2. Point 11 is accordingly displaced to point 11′, bringing another character on the typewheel into the printing position formerly occupied

by 11. The dotted lines in Fig. 1 show the position of the links when displaced by the movement of point 10 under the influence of the selection impulse. It is obvious that any desired movement of point 11 on the segment may be obtained by moving point 10 upward for different distances.

In Fig. 2 is shown the application of the second selection movement in such a way that it will act through the links of the first unit but in a manner which does not disturb point 10 which is the point of application of the first selection movement. Instead of point 9 being a fixed point it is made the lower end of an idler link 12 which swings about a fixed pivot 13. Links 12, 14, 16 and 17 form another unit exactly similar to links 1, 5, 7 and 8 in the first selection unit. An upward movement of point 18 to position 18′ causes point 15 to move upward and to the right to 15′. This causes the horizontal links 14, 7 and 5 to swing about points 13, 10 and 2. Point 11 on segment 3 is moved to point 11′. The movement of point 18 is different from the selected movement of point 10 and therefore imparts a different movement to point 11. In practice, point 10 is moved an amount sufficient to move segment 3 the space of 16 characters and the movement of point 18 is taken so as to produce a deflection of 8 character divisions on segment 3.

The combined movement of the two points 10 and 18 is shown in Fig. 3, producing a movement of 24 character divisions on segment 3.

It is obvious that as many selection units as desired can be added at the right of the two units shown in Figs. 2 and 3 and their movements will be projected through to the typewheel segment singly or will be cumulative if more than one selection is made at a time. In the usual printing telegraph mechanism five selection units are used for selecting the position of the typewheel or selecting the bar in a typebar printer. In some systems a sixth unit is used for the purpose of distinguishing between figure and letter characters. We have shown five selection units adapted to be actuated by the five selecting magnets which respond to the five impulses of the code characters.

In Fig. 4 is shown the number of links required and the manner of their arrangement for the five selection impulses necessary to give 32 character positions on the typewheel. The upward movement of point 10 (first selection) is such as to move a point on segment 3 through the space of 16 characters. Point 18 (second selection) is arranged to move so as to rotate segment 3 through 8 divisions. The third selection, acting on point 20, causes a movement of 4 character divisions; the fourth selection applied at point 21 causes a movement of two character divisions; while the fifth selection acting at point 22, causes a movement of one character division. Point 23 is the final fixed point at the end of five selection link mechanisms.

The dotted lines in Fig. 4 show the first selection operated. Point 9 in this case acts as a fixed point as the links at the right of point 9 form a rigid system which does not yield.

In Fig. 5 only the fifth selection at the extreme right of the system of links is shown operated. With point 23 fixed, point 24 is caused to move upwards and to the right to the position 24′. Every link at the left of point 24 swings to the right a corresponding distance, resulting finally in the desired movement of the character segment 3. All of the intermediate links retain their parallel relationship and merely pass on the motion imparted to them by links at their right.

Links 12, 33, 25 and 26 are idler supporting links designed to make the five units independently operative while allowing their motions to combine correctly.

There are numerous possible variations from the link system shown which retain the same principles of operation. The most important of these are noted in the following description. Most of the variations are for the purpose of making the system compact in size and of reducing the necessary deflections of the selection points 10, 18, 20, 21 and 22 to practical limits.

In Fig. 6, we have shown an arrangement wherein the positioning links 5, 7, 14, 16, 27, 28, 29, 30, 31 and 32 do not form a straight line when in non-selected position but are placed at various angles. The advantage of this arrangement is that a greater movement of arm 1 and of segment 3 results from the same upward movement of point 10, than when the links named are normally in a straight line. The reason for this is that when point 10, for example, is moved upward by a selection impulse, point 6 moves about point 9 as a pivot and being on the upper part of the circle, swings farther to the right than is shown in Fig. 1 for exactly the same upward movement of point 10. The same holds true for other units of the system. Conversely, to obtain the desired movement of segment 3, it is not necessary to move the selecting links which are connected to the printer selecting magnets at points 10, 18, 20, 21 and 22 as far as if the intermediate links 5, 7, 14, 16 etc. were in a straight line. This is shown in Fig. 6 where the movement of segment 3 is the same as in Fig. 4 but the movement of point 10 is much less. By changing the angles of the intermediate links, making them different for each unit, the movement of the selecting points can be made nearly the same for each unit.

The system of links shown in Figs. 1 to 6 forms a long, thin chain which obviously would be unwieldy if made up in this manner

for a printer. In our preferred form the second selection unit, composed of links 14, 17, 16 and 33, is placed directly back of the first selection unit. The third selection unit, in turn, composed of links 27, 36, 28 and 25 is placed back of the second selection unit. Similarly the fourth and fifth units are placed to the rear of the others so that the resulting system of links is only the width of one selection unit. Fig. 7 shows this arrangement of links. In this figure the links are designated by the same reference characters. The intermediate links 5, 7, 14, 16, 27 etc. are arranged angularly instead of in a straight line for reasons explained in connection with the arrangement of Fig. 6.

With the arrangement of links shown in Fig. 7, the direction of movement of segment 3 resulting from a movement of selecting points 18 and 21 is opposite to that resulting from a movement of the other three selecting points 10, 20 and 22. To explain further, an upward movement of point 10 will pull arm 1 and segment 3 toward the right as link arm 7 rotates about stationary point 9. On the other hand when point 18 is moved upward for its selection, point 19 is the stationary point about which link 16 swings, causing point 9 to be pulled towards the left. Point 9 and arm 12 rotate about fixed pivot 13. When point 9 is thus pulled to the left it pushes links 7 and 5 and consequently arm 1 and segment 3 toward the left. Similarly it will be seen from Fig. 7 that movement upwards of points 20 and 22 will cause movement of arm 1 and segment 3 to the right, while movement upward of point 21 will cause movement of the segment 3 towards the left.

In practice, the amount of movement upward of selecting point 10 is so chosen as to cause a movement of point 11 on segment 3 sixteen character divisions to the right. Movement of selecting point 18 causes a movement of point 11 eight divisions to the left. Movement of selecting point 20 causes movement of point 11 four divisions to the right. Movement of point 21 causes movement of point 11 two divisions toward the left, and finally, movement of selecting point 22 causes movement of point 11 one character division towards the right. Any one of 32 (inclusive of start position) possible positions of point 11 is therefore obtained by different combinations of the five selection impulses acting on selecting points 10, 18, 20, 21 and 22. The five selecting magnets M of the printer are indicated conventionally, the armatures A being carried by lever-arms pivotally attached at their outer free ends to said movable selecting points.

Of course if links 14, 16 and 29, 30 form an angle with the apex upward as in Fig. 7, it is possible to operate points 18 and 21 downward for a selection instead of upward, in which case their movement would deflect segment 3 toward the right, the same as results from a movement of the other three selecting points. All characters on the segment 3, or all gear teeth if 3 is a gear segment, would then be at the left of point 11 and all movements of the segment in response to line impulses or code selections would be toward the right. Practically it appears more desirable to have characters on each side of point 11. As illustrated in Fig. 7, movement of point 11 twenty-one character divisions to the right is possible and movement of the same point ten character divisions to the left is also possible. This means that there are twenty-one characters on the segment at the left of point 11 and ten characters on the segment at the right of point 11 which can be rotated by the line impulses or code selections to the location of point 11, the printing point.

An important detail of this mechanism is that no resetting of the selecting links or character segment 3 is necessary after printing. For example, if point 18 is selected for a character it remains in its selected position for succeeding characters as long as those characters have that unit selected in their code combination. Selecting point 18 is returned to its non-selected position only when a character is to be printed having that unit not selected. The character segment therefore moves from its selected position to each succeeding selected position directly without returning to a normal or non-selected position.

Another detail which is important is that the order of selecting impulses does not have to be fixed. Points 10, 18, 20, 21 and 22 may be operated in sequence, they may be operated all together, or they may have any desired amount of overlap one with another, the amount of overlap varying with each impulse if so desired. In other words there is no definite relation required in time of operation of selecting points 10, 18, 20, 21 and 22. The mechanism is therefore adaptable to control from any kind of selection operated mechanism. This may take the form of magnets which can be operated from segments on a distributor head, thus making this link system applicable to a Multiplex printer. Or it may be in the form of levers operated from a synchronously rotating cam shaft as would be the case in a Simplex printer or ticker.

Due to the ability with this mechanism of having any desired working overlap of one selection over another, it is possible by making selection "one" the 16 division selection and having it work over the range of the other four, to so arrange the mechanism that the typewheel is positioned immediately after the fifth selection with a comparatively slow peripheral velocity of the typewheel, in that its greatest movement is distributed over the five selections. Thus with the typewheel peripheral velocity comparatively slow and no

lost time due to mechanical setting because of setting during selections, the only mechanical overlap time needed is the press function. This function, because there is no necessity for that for setting or clearing out, can be very fast and light.

The result of this assembly of mechanisms is that a much greater printing speed can be maintained with no greater stress or strain on the operating parts.

The link system described is therefore applicable to any kind of a typewheel printer whether operated simplex or multiplex. The associated mechanism required for moving or selecting the points 10, 18, 20, 21 and 22 is not explained or illustrated in the drawings.

Another modification in the link system which we may take advantage of is the multiplication of motion by connecting the intermediate links at different points on the vertical rods. For example, if instead of pivoting links 7 and 14 (Fig. 7) to 12 at a common point 9, link 7 can be left pivoted at 9 while link 14 is secured at some point higher up on the link 12. When point 18 is selected, therefore, a movement of the link 14 will cause a greater movement of point 9 and hence of link 7 and segment 3, than is the case when both 7 and 14 are pivoted at 9. We have found this to be a desirable arrangement in practice. The intermediate links may be connected at varying distances upon vertical rods 1, 12, 33, 25 and 26. This also results in permitting the selected movements of points 10, 18, 20, 21 and 22 to be more nearly equal to each other and still obtain the desired deflection of segment 3.

We claim:

1. In a printing telegraph receiver, a type-member arranged to be selectively rotated to a printing position, means for selectively positioning said type-member, comprising a series of positioning links pivotally connected together end to end to form a continuous chain, a set of supporting members each pivotally connected at one end to certain of said pivotal connections and oscillatable about fixed points to which their opposite ends are secured, and a set of selecting members each pivotally connected at their inner ends to the remaining pivotal connections, and means for moving their outer ends in response to received code character impulses.

2. In a printing telegraph receiver, a type-member arranged to be selectively rotated to a printing position, means for selectively positioning said type-member, comprising a series of positioning links pivotally connected together end to end to form a continuous chain, a set of supporting members and a set of selecting members alternating therewith, the inner ends of each set being connected to said pivotal connections and the outer ends of said selecting members being reciprocable in response to received code character impulses.

3. In a printing telegraph receiver, a type-member arranged to be selectively rotated to a printing position, means for selectively positioning said type-member, comprising a series of pivotally connected links operatively connected to said type-member, a plurality of selecting devices under the control of line impulses and connected alternately to said pivotal connections.

4. In a printing telegraph receiver as set forth in claim 3, said links being arranged in angularly positioned pairs, and adjacent pairs being oppositely directed.

In testimony whereof we affix our signatures.

EVAN R. WHEELER.
ROBERT F. DIRKES.