March 12, 1963 J. RABINOW ETAL 3,080,985

ROTARY CODE WHEEL SETTER

Filed May 24, 1960 2 Sheets-Sheet 1

FIG. 1

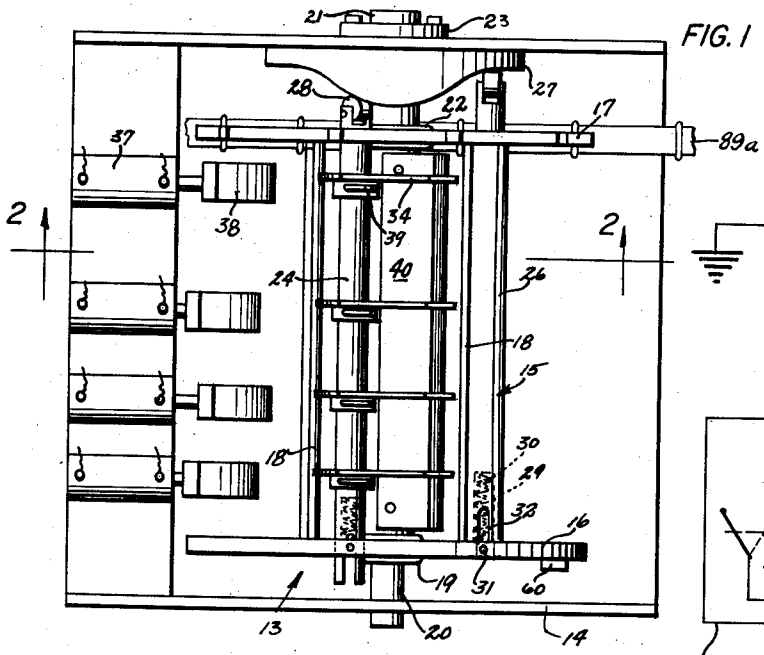


FIG. 6

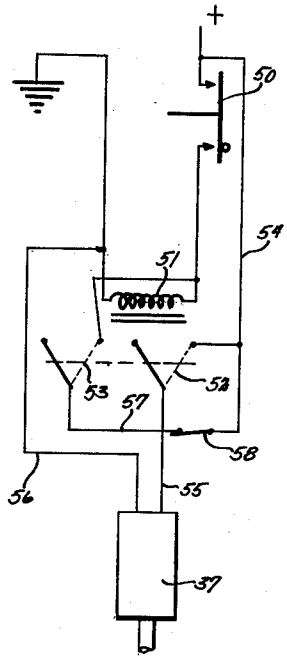


FIG. 2

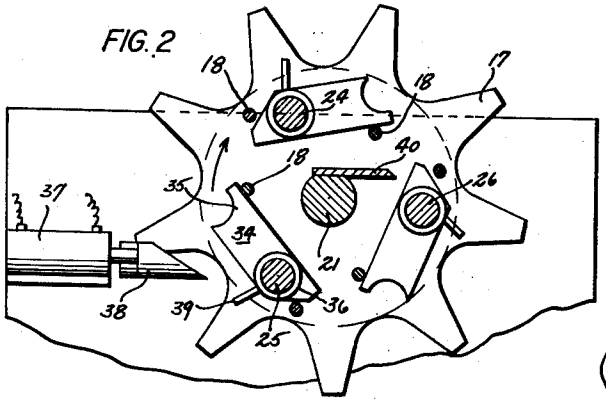


FIG. 5

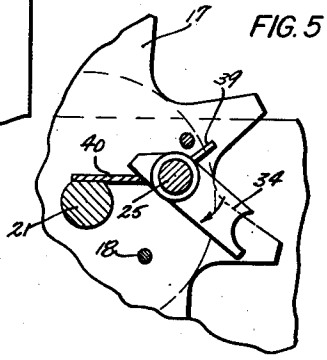


FIG. 3

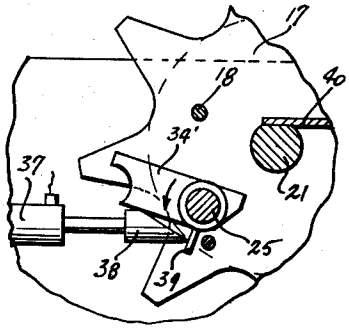
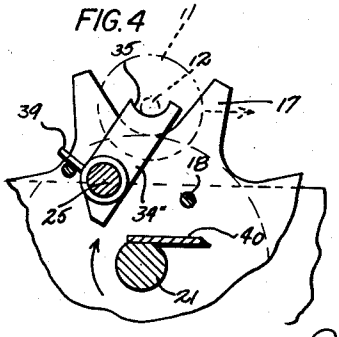


FIG. 4



INVENTORS
Jacob Rabinow
John W. Balenger

BY Joseph A. Genovese

ATTORNEY

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Filed May 24, 1960

2 Sheets-Sheet 2

FIG. 7

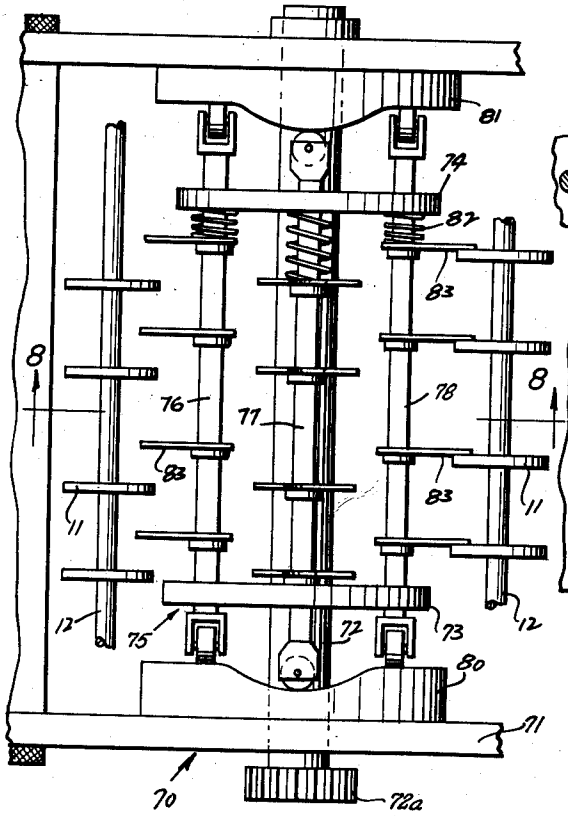


FIG. 8

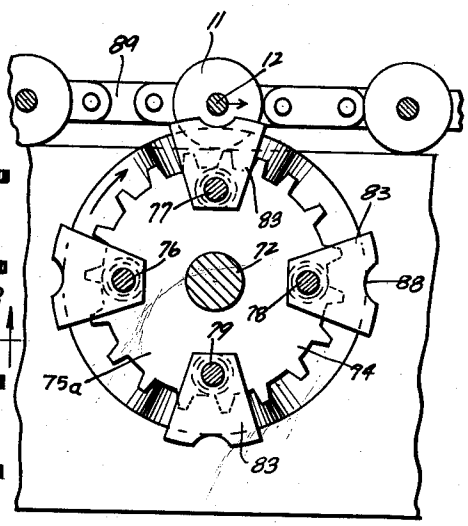
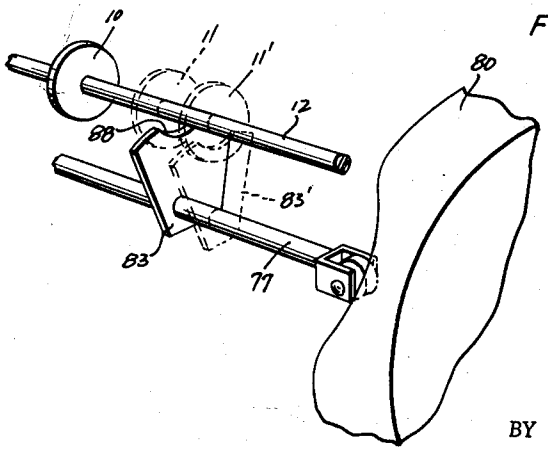


FIG. 9



INVENTORS
Jacob Rabinow
John W. Balenger

BY Joseph A. Genovese

ATTORNEY

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ROTARY CODE WHEEL SETTER

Jacob Rabinow, Takoma Park, and John W. Balenger, Greenbelt, Md., assignors, by direct and mesne assignments to Rabinow Engineering Co. Inc., Rockville, Md.

Filed May 24, 1960, Ser. No. 31,383
12 Claims. (Cl. 214—11)

This invention relates to devices for setting code elements such as are used in coding or programming various sorting or controlling apparatus.

Although the principles of our invention are generally applicable for setting and resetting code devices used in connection with numerous types of equipment, our invention is particularly well adapted to set and reset code means such as those disclosed in the Rabinow et al. Patent No. 2,901,089. Briefly, the code device disclosed in that patent is composed of groups of code wheels adjustable to selected positions on supporting shafts by sliding the code wheels axially on the shafts. The code wheels coact with stationary code bars so that when the codes match, a given operation results.

An object of this invention is to provide a much simpler, quicker and more satisfactorily operative code setting device to adjust code elements to a given code position or to adjust the elements to a "clear" or reset position. The adjustment of code elements apply as a substitute for the code adjusting means in the Rabinow patent, but it is to be clearly understood that the invention is not restricted to such a single use. On the contrary, in practically any situation where it is desired to adjust code elements rapidly, effectively and with certainty, one or more of the embodiments of our invention will serve this purpose.

Briefly, exemplary forms of our invention have a rotary structure constrained to rotate about an axis of rotation, together with a number of arms mechanically required to move in a direction essentially parallel to the axis of rotation of the rotary structure. By proper timing, the code elements occupy positions laterally opposed to the arms at the time that the arms move in their path of travel parallel to the axis of rotation of the rotary structure. The result is that the code elements being in the path of movement of the arms, are pushed to a new position which may be considered a "set" or "reset" position.

In one form of our invention the arms are in a fixed radial or approximately radial position with respect to the rotary structure. The arms are capable of movement in a direction parallel to the axis of rotation of the rotary structure, but they do not turn with respect to the balance of the rotary structure. Another embodiment of our invention requires that the arms to be rotationally adjusted to code-element-actuating and code-element-non-actuating positions by moving selected arms in planes at right angles to the axis of rotation of the rotary structure. In this way selected code elements of a group may be singled out for adjustment, while the other code elements of the same group are unaffected during a single cycle of operation of the rotary code wheel setter.

Accordingly, a further object of the invention is to provide a code element setting device relying on the rotation of a rotary structure to position a group of arms adjacent to the code elements and further relying on movement of the arms in a direction parallel to the axis of rotation, to shift the code elements to new positions. As pointed out above, all code elements of a group may be simultaneously shifted or, if desired, there may be a selection of one or more code elements of the group by adjustment of the arms of the rotary structure.

The setter disclosed in Patent No. 2,901,089 must function for a complete reciprocation cycle for every group of code wheels. The accelerations and noise level are high. These difficulties are avoided by the invention by having the wheel setting arms move in the same direction as the translation of the wheels, giving an appreciable time for the arms to move in the wheel setting travel. Thereafter, the arms may be slowly returned to the original position since they are not called upon for another duty cycle until all other groups of arms have undergone a duty cycle. The result is smooth, comparatively slow arm motion with no possibility of overshooting.

Another feature of the invention is that the arms are automatically reset to a starting position as the rotary structure operates. In one form of the invention this is achieved by having the arms engage a stationary abutment causing them to be turned inward of the rotary structure during normal operation of the setter.

Other objects and features of importance will become apparent in following the description of the illustrated forms of the invention.

FIGURE 1 is a top view of one our setters.

FIGURE 2 is a sectional view taken on line 2—2 of FIGURE 1 and showing the position of the arms in the fully withdrawn position.

FIGURE 3 is a diagrammatic view showing one arm being adjusted to a code element engaging position.

FIGURE 4 is a diagrammatic view showing the adjusted arm of FIGURE 3 as it would appear when engaging a code element.

FIGURE 5 is a diagrammatic view showing the arm in FIGURES 3 and 4 being returned toward the position shown in FIGURE 2.

FIGURE 6 is a diagrammatic view showing the wiring of one of the solenoids of the setter of FIGURE 1, there being a single solenoid to set each arm.

FIGURE 7 is a top view of another setter constructed to exemplify the invention.

FIGURE 8 is a sectional view taken on line 8—8 of FIGURE 7 and showing one of the arms engaging one of the code elements.

FIGURE 9 is a fragmentary perspective view to show the movement of one of the arms in the process of setting one of the code elements on its supporting shaft.

In the accompanying drawings attention is first invited to FIGURES 1–6 and 9. FIGURE 9 shows code elements **10** and **11** in the form of wheels which are axially adjustable on a supporting shaft **12**. Code element **11** is also shown in an adjusted position 11^1. One kind of code device whose elements are axially adjusted on their shafts by either illustrated embodiment of our setter (FIGS. 1 and 7), is fully disclosed in U.S. Patent No. 2,901,089.

Setter **13** (FIGS. 1–6) to adjust the position of code elements **10** and **11** (FIG. 9), is composed of a suitable frame **14**, supporting a rotary structure **15**. Structure **15** is composed of end members **16** and **17** connected together by bars **18**. End member **16** has a bearing **19** in which shaft **20** is disposed. Shaft **20** is mounted in a side of frame **14** and in the illustrated setter **13**, shaft **20** is merely a fixed supporting shaft. Rotation of structure **15** is obtained in any suitable way, for example by driving member **17** shown as a sprocket by chain **89***a*, which is driven by suitable means as a motor (not shown), operating in synchronism with a sorting machine as more fully described later in connection with the embodiment of FIGURE 8.

Fixed spindle **21** has one end disposed in bearing **19** and extends through a bearing **22** in member **17**. The extremity of fixed spindle **21** is secured, for instance by clamp **23**, to a wall of frame **14**. Accordingly, the fixed spindle **21** establishes an axis of rotation for rotary structure **15**.

A number of axially movable shafts **24**, **25** and **26** ex-

tend between and through openings in members 16 and 17. The axially movable shafts 24, 25 and 26 are uniformly radially spaced outward from the axis of rotation, and it is understood that the number of shafts 24, 25, and 26 may be increased or decreased. There are means for axially moving shafts 24, 25 and 26 in timed sequence with the rotation of structure 15. These means preferably consist of a cam 27 fixed to a wall of frame 14, and cam followers 28 at one end of each shaft 24, 25 and 26. The cam followers may be rollers or simply the ends of the shafts. Resilient means react on each shaft to oppose the axial movement of the shafts in one direction and to assure that the cam followers will always contact the surface of cam 27. These resilient means may be varied in configuration, a satisfactory construction being a single spring 29 in a recess 30 and seating on a transverse pin 31 attached to member 16 and spanning a slot 32 in the side walls of recess 30. By this construction the bias of spring 29 is in a direction tending to keep the cam follower 28 in contact with the surface of cam 27 at all times.

Each shaft has a number of identical code wheel engaging arms. For instance, a typical engaging means would be arm 34 on shaft 25 (FIGURE 2). The arm has a recess 35 at its outer end and a bearing 36 at its inner end. The friction between bearing 36 and shaft 25 is such that when arm 34 is rotated on shaft 25 it will maintain its new position until physically moved to another position.

Electromechanical means preferably attached to frame 14, but not necessarily so, rotationally actuate arm 34. The electromechanical means include a single solenoid 37 for each arm on a particular shaft 25, and a cam attached to the armature of the solenoid. Arm 34 has a pin 39 attached to its bearing 36 alongside of the face of arm 34. When the solenoid 37 is actuated the armature extends to the position shown in FIGURE 3, at which armature cam 38 contacts pin 39. This cam 38 acts as an interposer rotating arm 34 into position 34^{1} (FIGURE 3).

As the rotary structure 15 continues to rotate, the arm 34 achieves a final position 34^{11} (FIGURE 4), and the recess 35 reaches its highest position shown in FIGURE 4. In this highest position code element supporting shaft 12 is straddled within recess 35. At about this point the entire shaft 25 is moved axially in a direction parallel to the axis of rotation of structure 15 thereby causing a face of arm 34 to engage element 11 and move it to a new position, for instance 11^{1} (FIGURE 9). FIGURE 9 shows the action of the resetter described later.

Continued rotation (FIGURE 5) of structure 15 brings shaft 25 and arm 34 to a position at which the inner end of arm 34 strikes abutment 40 which is attached to the spindle or stationary shaft 21. The abutment may be in the form of a blade so that the rotation of structure 15 with respect to the fixed blade 40 will cause arm 34 to be returned to the initial position (FIGURE 2). The inward movement of the outer end of arm 34 is limited in its travel by edges of the arm contacting stop bars 18.

Typical circuit (FIGURE 6) is for one solenoid 37. All other circuits, there being one for each solenoid, can be identical. This circuit merely diagrammatically represents one possible way of operating the solenoids on demand. The demand may be created by a human operator or by electronic means (FIG. 6). Since manual operation is the simplest, the function of the circuit will be described on this basis. A manual switch 50 is interposed in one side of a line feeding a double pole double throw relay 51 having switch sections 52 and 53. When switch 50 is momentarily closed, and this switch may be, for example, operated by a key of a typewriter keyboard, the relay 51 is energized and switch sections 52 and 53 close. This energizes solenoid 37 through lines 54, 55 and switch section 52. At the same time the coil of the relay is locked-in through the holding circuit line 57, switch section 53, and the manually closed switch 58. Switch 50 may be only momentarily closed and released, however, the switch sections of the relay remain in the closed position.

There are means connected with rotary structure 15 for opening the holding circuit line 57 and these are exemplified by normally closed switch 58. The switch 58 is mounted suitably so that a switch operator 60 (FIGURE 1) attached to a part of the rotary structure, physically opens the normally closed switch 58. In an embodiment of the setter having three shafts 24, 25 and 26, three switch operators 60 are uniformly spaced on rotary structure 15, e.g. member 16 thereof.

FIGURES 7–9 show another setter 70 for moving code elements 10, 11 on their supporting shafts 12. Setter 70 adjusts the code elements i.e. "sets" them to a given position. In the sense that setter 13 moves selected code elements for coding or programming purposes, and setter 70 returns the same code elements to the original position, setter 70 may be considered a "resetter."

Frame 71 of setter 70 is suitably constituted to support shaft 72 which has bearing support in two walls of frame 71. Members 73 and 74 quite similar to members 16 and 17, are secured to shaft 72, and the shaft 72 may be rotated in several ways such as by a drive gear 72*a* (FIGURE 7) or the like fixed directly to shaft 72, or by having member 74 constitute a sprocket 75*a* (FIGURE 8) or drive gear receiving torque from an external source. Regardless of the method adopted for propulsion, rotary structure 75 of which shaft 72 and the members 73 and 74 are a part, is rotated about a longitudinal axis of rotation established by shaft 72.

A number of axially movable members such as shafts 76, 77, 78 and 79 (FIGURE 8) extend through openings in members 73 and 74, and there are cam followers at both ends of these shafts. The cam followers engage two cams 80 and 81 which are fixed to walls of frame 71. With this construction as described so far, rotation of structure 75 will cause the shafts 76, 77, 78 and 79 to be rotated, i.e. travel in a circular path of travel about the axis of rotation of shaft 72. The cams 80 and 81 will cause the shafts 76, 77, 78 and 79 to move axially during the rotation of structure 75.

Springs 82 are unnecessary in the form of the invention shown in FIGURE 7 but they can be used as shown. The two cams 80 and 81, properly spaced, will provide a positive drive for the axial movement of shafts 76, 77, 78 and 79. However, springs 82 may be used with the advantage of omitting one of the cams, for example cam 81 (as, for example, in FIGURE 1) and all of the cam followers which engage cam 81.

Arms 83 (FIGURES 7–9) are rigidly attached to shafts 75, 76, 77, etc. They are preferably constructed in the form of short flat plates with recesses 88 at the outer ends thereof in order to provide ample clearance for supporting shaft 12 (FIGURE 8) when the arms on a particular shaft 77 are engaged between code elements 11. At that time the axaially movable shaft 77 is caused to so move by the shape of cams 80 and 81. Since it is postulated that there are as many arms 83 on a single shaft as there are code elements on a supporting shaft, all code elements 10, 11 on a typical supporting shaft 12 are simultaneously adjusted as the arms move to the position 83^{1} (FIGURE 9) during rotation of structure 75.

In practical use, reference is made to U.S. Patent No. 2,901,089. FIGURE 8 shows one way to mount setter 70 and rotate its rotary structure; and it is understood that setter 13 can be similarly mounted and its rotary structure rotated in synchronism with the movement of chain 89. Setter 70 is secured to the frame of the machine disclosed in this patent beneath (or above) a flight 89 of the endless conveyor chain which propels the pockets of the machine. Resetter 13 is similarly mounted. The code element supporting shafts 12 move in coordination with the movement of the trays containing the pockets, and the rotation of structure 75 (and 15 of FIGURE 1) may be obtained from or derived from

movement of chain 89 or movement of any shaft, gear, sprocket, etc. which turns at a rate proportional to the translation of shafts 12.

Although a few forms of the invention have been illustrated and described, it is apparent that the embodiments are given only by way of example and that various modifications may be made in construction and arrangement without departing from the protection afforded by the following claims.

We claim:

1. A setter for a code device which has a plurality of code elements that move in a constrained path of travel and which are adjustable in a direction at an angle to said path of travel, said setter comprising a rotary structure having axially movable parallel shafts, lateral code element engaging means, means movable mounting said engaging means on said shafts, means engageable with said engaging means to adjust said engaging means on said shafts so that selected engaging means may be moved between the code element engaging and non-engaging positions, and means contacting said shafts for axially moving said shafts to displace certain of the code elements in accordance with the positions of said engaging means on said shafts.

2. A setter for a code device which has a plurality of code elements that move in a constrained path of travel and which are adjustable in a direction at an angle to said path of travel, said setter comprising a rotary structure having axially movable parallel shafts, lateral code element engaging arms, means movably mounting said arms on said shafts, means engageable with said arms to adjust said arms on said shafts so that selected arms may be moved between the code element engaging and non-engaging positions, means contacting said shafts for axially moving said shafts to displace certain of the code elements in accordance with the positions of said arms, and means adjacent to said arms for re-adjusting said arms to an initial position in response to the rotary movement of said rotary structure.

3. The setter of claim 2 wherein said arms re-adjusting means are mechanical and said arms adjusting means are electrically operated.

4. In a setter for a code device having code elements moving in a constrained path of travel and which are adjustable in a direction at right angles to the path of travel, a rotary drum having shafts axially movable at right angles to said path of travel, a plurality of code element engaging members carried by said shafts, means mounting said drum adjacent to the code device so that said members move between the code elements as said drum rotates and the elements move in their path of travel, means engaging said shafts to axially move the shaft with members between said elements thereby setting the elements and also to return said shaft to an initial position when the rotation of said drum displaces the last-mentioned shaft to a position at which said members are separated from between said elements.

5. The setter of claim 4 wherein said code element engaging members are adjustably mounted on said shafts so that selected members may be moved to positions at which they avoid engaging code elements when said shafts are axially moved.

6. The setter of claim 5, and means for adjusting selected members on said shafts.

7. The setter of claim 6, and means responsive to drum rotation for re-adjusting said members to an initial position on said shafts.

8. A wheel setter for a code device which has a plurality of laterally spaced shafts that move in a generally linear path of travel in a direction lateral to said shafts, each shaft having a group of code wheels, said wheels of each group being adjustable to selected positions on their shaft in a direction axially of said shaft; said setter comprising a rotary structure whose rotation is synchronized with the linear motion of said laterally spaced shafts, said structure including a plurality of axially movable members which are radially spaced from and parallel to the axis of rotation of said structure, code wheel engaging devices carried by said members, the engaging devices of one member moving into positions in between adjacent code wheels of one of said shafts as said structure rotates in synchronism with the linear motion of said code wheel shafts, and means to axially move the last-mentioned member when the wheel-engaging devices thereof are between the wheels of one of said code wheel supporting shafts to thereby cause said devices to move said code wheels axially on their supporting shaft.

9. The wheel setter of claim 8 wherein there are means to adjust selected code wheel engaging devices and leave the other devices of one group thereof unadjusted so that selected devices come between predetermined code wheels whereby selected code wheels on a given shaft are adjusted and the others are not adjusted when the last mentioned member is axially moved.

10. A wheel setter for a code device which has a plurality of laterally spaced shafts that move in a generally linear path of travel in a direction lateral to said shafts, each shaft having a group of code wheels, said wheels of each group being individually adjustable to selected positions on their shaft in a direction axially of said shaft; said setter comprising a rotary structure whose motion is mechanically synchronized with the linear motion of said laterally spaced shafts, said structure including a plurality of axially extending members which travel adjacent to the path of said shafts for at least a portion of their movement and are axially shiftable at an angle to the direction of said movement, code wheel engaging devices carried by said members, the engaging devices of each member being selectively adjustable into positions in between adjacent code wheels of one of said shafts as said structure moves in synchronism with the linear motion of said code wheel shafts, and means to axially shift the last-mentioned member when the wheel-engaging devices thereof are between the wheels of one of said code wheel supporting shafts to thereby cause said devices to move selected ones of said code wheels axially on their supporting shafts as the shaft and member move in synchronism.

11. The wheel setter of claim 10 wherein the means to adjust selected code wheel engaging devices include means to leave the other devices of one group thereof unadjusted so that only selected devices come between predetermined code wheels whereby selected code wheels on a given shaft are adjusted and others are not adjusted in accordance with a desired code setting when the last-mentioned member is axially moved.

12. In a setter for a code device having code elements moving in a constrained path of travel and which are adjustable in a direction at an angle to the path of travel, a rotatively movable structure having members movable in approximately the same direction as said constrained path and also movable at an angle to said path of travel, a plurality of code element engaging means carried by said members, means mounting said structure adjacent to the code device so that said engaging means move between the code elements as said structure moves and the elements move in their path of travel so that said engaging means temporarily move with and are interdigitated between adjacent code elements, and means to move the code element engaging means while they are between said elements, the last mentioned movement being at an angle to said constrained path of travel for adjusting the positions of the code elements.

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