

April 11, 1961

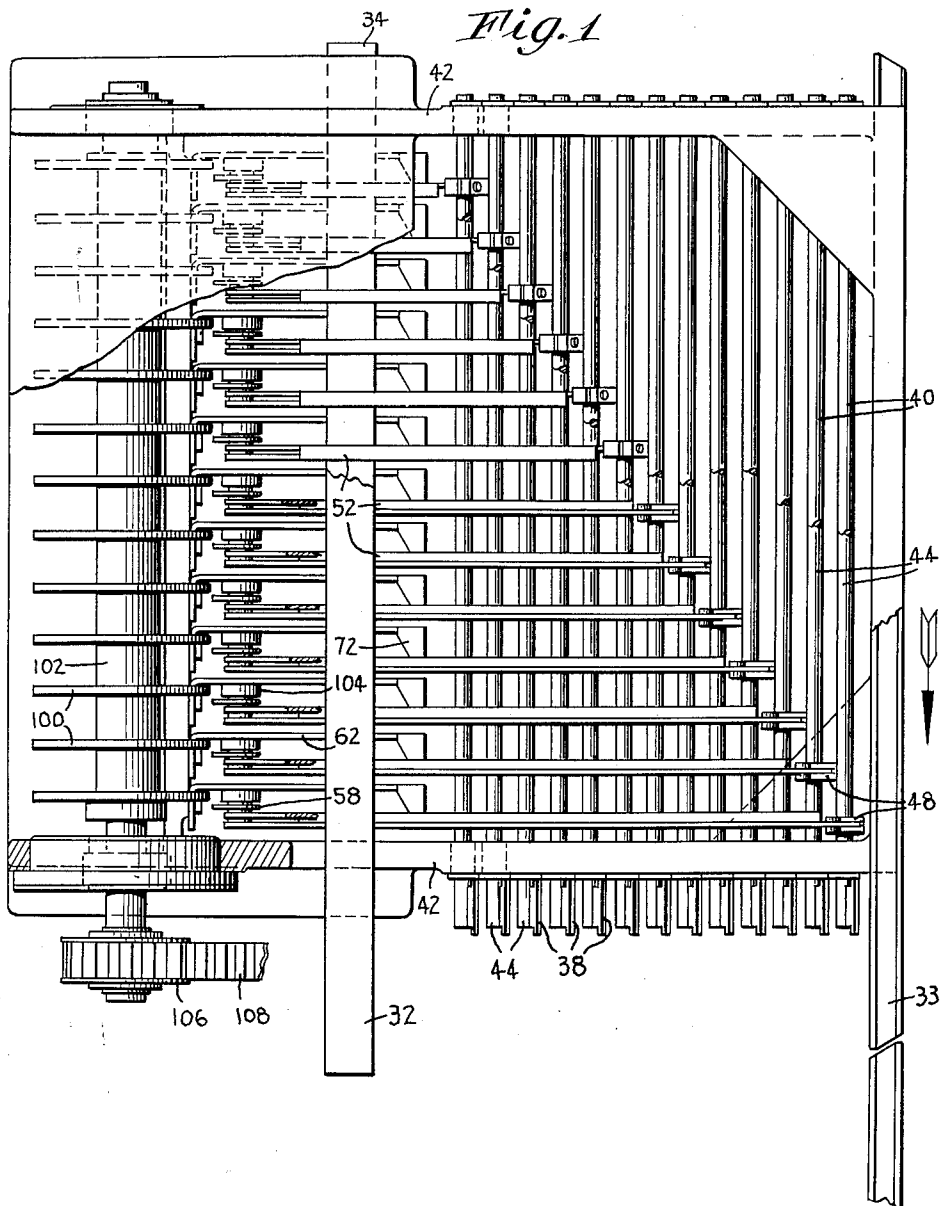
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2,979,183

CODE ELEMENT SHIFTING DEVICE

Filed March 20, 1959

4 Sheets-Sheet 1



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4 Sheets-Sheet 2

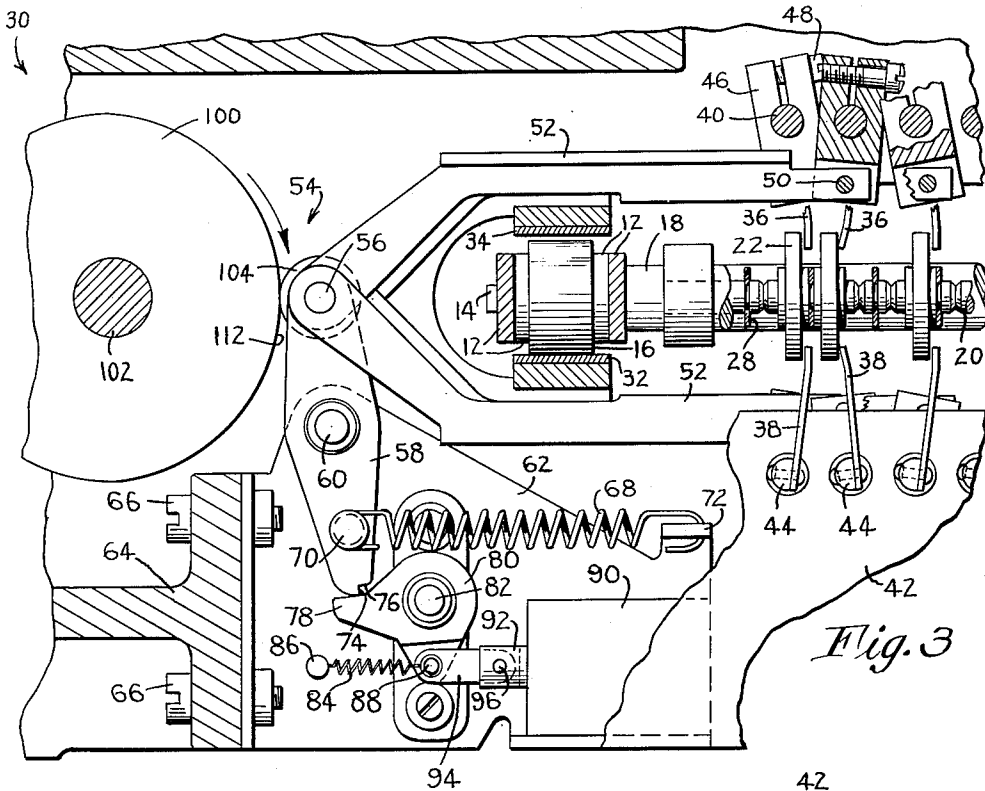


Fig. 3

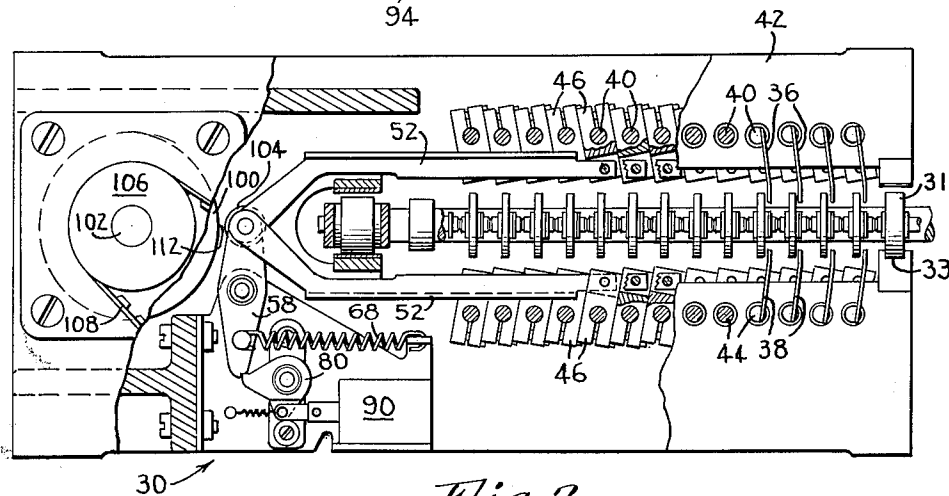


Fig. 2

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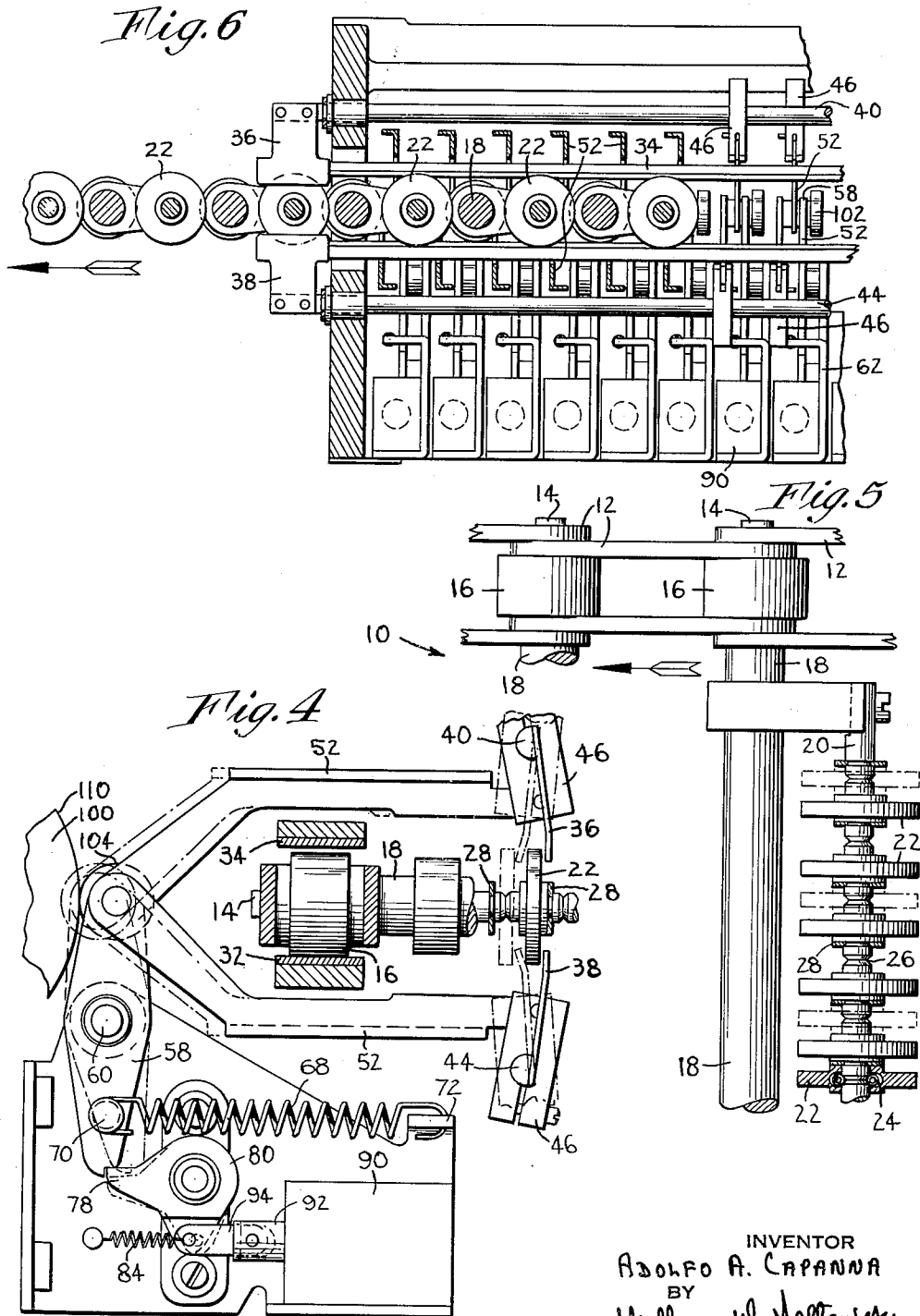
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CODE ELEMENT SHIFTING DEVICE

Filed March 20, 1959

4 Sheets-Sheet 3



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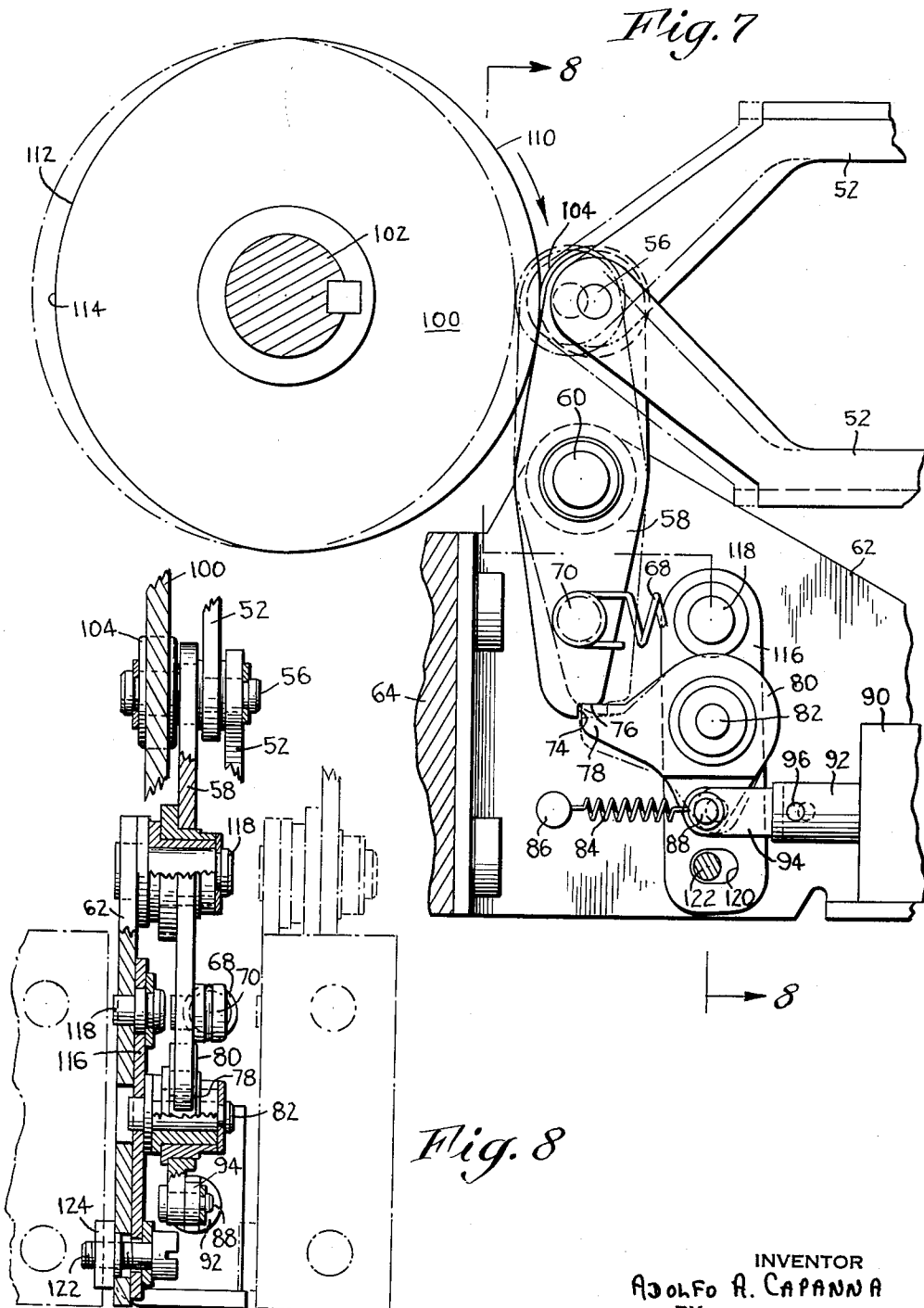
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CODE ELEMENT SHIFTING DEVICE

Filed March 20, 1959

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2,979,183

CODE ELEMENT SHIFTING DEVICE

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Filed Mar. 20, 1959, Ser. No. 800,891

9 Claims. (Cl. 198—38)

This invention relates to a motion-translating mechanism and to a code element shifting device incorporating the same. The invention is adapted for use with the respective mail-handling machines disclosed in U.S. Patent application Serial No. 644,017 filed on March 5, 1957, by J. Rabinow et al., now Patent No. 2,901,089, and in U.S. Patent application Serial No. 786,134, filed January 12, 1959, by E. W. Tangard.

Each of these patent applications discloses an article handling apparatus which comprises an endless conveyor carrying a plurality of successive pockets adapted to receive, convey and discharge articles such as letter mail. Each of the pockets is associated with a shaft having a plurality of code wheels thereon. The code wheels on each shaft are individually shiftable between a home position and an alternate position so as to code each respective shaft thereby to effect the discharge of the contents of an associated pocket at a particular one of a plurality of discharge locations. In this manner, sorting of the letter mail is accomplished. More particularly, each pocket and its associated shaft are moved by the endless conveyor past a first station at which the pocket is loaded with a letter and the code wheels on the shaft are set to coded positions, and then are moved past a plurality of discharge locations at one of which locations the pocket discharges the letter due to coincidence between the code wheels on the shaft and a correspondingly coded arrangement of depressions at that discharge location. After moving past the last of the discharge locations, the respective shaft is moved by the conveyor past a code wheel-clearing station. At this station each of the code wheels in said alternate position is returned to said home position. Subsequently, the respective pocket and shaft move again to said first station where another letter is deposited in the pocket. Also at this station, certain of the code wheels on the shaft are shifted from their home positions to their alternate positions thereby providing a determined code combination whereby that shaft is again coded for discharge of the deposited letter at a particular location, and the cycle goes on to repeat itself.

The embodiment of the invention disclosed herein is adapted to be disposed at said first station and provides for the above-described selective shifting of certain of the code wheels, according to a determined code combination, from their home positions to their alternate positions. This embodiment includes a plurality of pairs of opposed fingers, each pair being operatively associated with a respective rocker member for actuation of that pair of fingers to shift a code wheel when the rocker member is moved from a normal position to an advanced position. The rocker member is yieldably biased toward said advanced position. A stop, which engages an abutment carried by the rocker member to retain the latter in said normal position, is adapted to be retracted from its stop position by a selectively operable solenoid when the code wheel is to be shifted. After retraction of the stop, the rocker member moves to said advanced position under the

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control of a continuously rotating cam. The cam also functions to effect a slight movement of the rocker member to free the latter from the stop before the stop is retracted by the solenoid. This permits unobstructed retraction of the stop thus reducing the force required to be exerted by the solenoid and eliminating wear of both the stop and the abutment which would otherwise occur through repeated operation of the solenoid. When a code wheel is not to be shifted, the solenoid will not be energized so that the stop will not be retracted with the result that the latter retains the rocker member in said normal position and the associated pair of opposed, code wheel-shifting fingers is not actuated.

It is accordingly an object of this invention to provide a new and improved motion-translating mechanism and a new and improved device for shifting code elements incorporating said mechanism.

A further object of the invention is to provide such a mechanism and such a device which embody stop means effective to retain a member yieldably biased thereagainst, and whereby the stop means is retractable to a non-stopping position under a comparatively light force and without wear between the mutually engageable portions of the stop means and said member.

Another object of this invention is to provide such a mechanism and such a device which are simple in construction, economical to produce and dependable in operation.

Further objects and advantages will become apparent as the description proceeds.

An embodiment of the invention is shown in the accompanying drawings wherein:

Fig. 1 is a top plan view, with parts broken away, of a code element shifting device according to the invention;

Fig. 2 is a side elevational view thereof with parts broken away and showing a motion-translating mechanism including a retractable stop retaining a rocker member in its normal position whereby an associated pair of code wheel-shifting fingers is prevented from being actuated;

Fig. 3 is a fragmentary view of a portion of the structure shown in Fig. 2 but on an enlarged scale, the stop being shown in retracted position and the associated pair of code wheel-shifting fingers in actuated position;

Fig. 4 is a view similar to Fig. 3 but showing the parts in full lines with the stop in stopping position and the associated rocker member moved slightly away from the stop as occurs prior to retraction of the stop to the broken-line position and subsequent movement of the rocker member to the broken-line advanced position;

Fig. 5 is a fragmentary plan view of a portion of the endless conveyor which provides a plurality of successive code wheel-carrying shafts;

Fig. 6 is a front elevational view with parts in section and showing a portion of the endless conveyor in the act of moving in the direction of the arrow through the code wheel-shifting device;

Fig. 7 is a fragmentary view similar to Fig. 4 but on an enlarged scale and including the associated, continuously rotatable cam in its entirety, the latter being shown in the full-line and broken-line positions corresponding to those of the other movable parts as shown in this figure and in Fig. 4; and

Fig. 8 is a sectional view taken along line 8—8 in Fig. 7.

The invention will be particular described as it is associated with the mail handling machine of the above-mentioned patent application of E. W. Tangard, and it will be clear that the mail handling machine of the above-mentioned patent application of J. Rabinow et al. will cooperate therewith in the same manner.

Referring to Fig. 5, a portion of the endless conveyor

according to the above-noted patent application of E. W. Tangard is generally designated by the reference numeral 10. The conveyor 10 includes a plurality of links 12 pivotally mounted on pins 14, each of the latter rotatably mounting a roller 16 and being carried by a main shaft 18. Each main shaft 18 mounts a code wheel-carrying shaft 20 for pivotal movement thereabout. Each of the code wheels 22 on shaft 20 provides a groove about its inner periphery as shown by the cross sectional showing of the lowermost code wheel in Fig. 5. An annular coil spring 24 is nested in the groove in each code wheel. This spring is receivable in either of two grooves 26 provided by shaft 20 for each code wheel. When spring 24 is disposed in the lower one of the two grooves 26 as viewed in this figure the code wheel is retained in a home position, and when the spring is disposed in the upper groove 26 the code wheel is retained in an alternate position. A series of spring clips 28, each being disposed in a respective groove in shaft 20, act as stops to prevent overtravel of code wheels 22 when the latter are shifted from one of said home and alternate positions to the other.

Referring to Figs. 2 and 3, the code wheels 22 on a code wheel-carrying shaft 20 are shown in the act of moving through the code wheel-shifting device for the selective shifting of certain of these code wheels according to a determined code combination as described above. The code wheel-shifting device is generally designated by the reference numeral 30. A lower track 32 and an upper track 34 are provided between which rides the roller 16 associated with each code wheel-carrying shaft 20. Each shaft 20 also carries a roller 31 which, in the above-mentioned patent application of E. W. Tangard, is designated as a master cam roller. It will suffice, for the purposes of this description, to note that roller 31 rides in and is guided by a track 33 whereby the shaft 20 is laterally centered relative to the code wheel-shifting device 30. The conveyor 10, which moves continuously, successively presents each shaft 20 and the code wheels mounted thereon to the code wheel shifting device 30. For any further details of endless conveyor 10 and its associated structure, reference is hereby made to the above-noted patent application of E. W. Tangard.

Referring to Figs. 1-4 and 6, shifting of each of the code wheels 22 from its home position to its alternate position is effected by the simultaneous actuation of a pair of opposed blades or fingers, each pair including an upper finger 36 and a lower finger 38. Each upper code wheel-shifting finger 36 is fixedly attached, as by a rivet, to the end of an upper longitudinally extending shaft 40 which is supported for pivotal movement about its axis by end plates 42 of the frame of the code wheel-shifting device 30. Each lower code wheel-shifting finger 38 is similarly attached to a lower longitudinally extending shaft 44. As shown in Figs. 1-3, rocker means in the form of a clamp block 46 is fixed in adjusted relation about each of the shafts 40, 44 by tightening a clamp screw 48. Each clamp block is bifurcated at one end. A pin 50 is supported by each block 46 at the bifurcated portion, and one end of an arm 52 is pivotally connected to each pin 50. As is apparent from the above description and from the drawings, each pair of opposed, code wheel-shifting fingers 36, 38 is actuated, through a pair of shafts 40, 44 and a pair of clamping blocks 46, by a pair of said opposed arms 52. Upon individual actuation of each pair of opposed arms 52 from the full line to the broken line position as shown in Fig. 4, the associated pair of opposed code wheel-shifting fingers 36, 38 will be swung to the left as viewed in Figs. 2-4 to shift a code wheel 22 in the same direction from its home position to said alternate position. Each pair of opposed arms 52 is actuated by an individual motion-translating mechanism generally designated at 54. The several motion-translating mechanisms are identical with each other according to the embodiment shown in the draw-

ings, and a detailed description of one will therefore suffice for all.

Referring particularly to Figs. 2-4 and 7, the other ends of the opposing arms 52 of each pair are pivotally mounted on a pin 56 carried by one end of a motion-translating element in the form of a rocker member 56. Rocker member 58 is pivotally mounted intermediate its ends by a stub-shaft 60 carried by a supporting plate member 62 provided by the frame of the device. Supporting plate member 62 is rigidly secured to a T-shaped section 64 of the frame by means of bolts 66. Rocker member 58 is yieldably biased in the counter-clockwise direction about shaft 60 by a tension spring 68 having one end connected to a pin 70 carried by the rocker member and its other end connected to an angular extension 72 of the supporting plate member 62.

The other end of rocker member 58 is notched to provide an abutment 74 and a shoulder 76, both of which are engageable with a nose 78 of a retractable pawl or stop 80. Stop 80 is mounted for pivotal movement about a shaft 82 from a stopping position as shown in full lines in each of Figs. 2, 4 and 7 to a retracted, non-stopping position as shown in Fig. 3 and in broken lines in each of Figs. 4 and 7. A tension spring 84 is connected at one end to a pin 86 carried by supporting plate member 62 and at its other end to a pin 88 carried by the stop 80 whereby the latter is yieldingly urged from the retracted to the stopping position. At the stopping position, nose 78 of the stop 80 is engaged with shoulder 76 of the rocker member. Selectively operable electromagnetic means in the form of a solenoid 90 is provided for retracting stop 80, the solenoid being effective when energized to move a plunger 92 to the right as viewed in Figs. 2-4 and 7. A link 94 is pivotally connected at one end to pin 88 and at its other end to a pin 96 carried by plunger 92 whereby said movement of plunger 92 to the right effects counter-clockwise movement of stop 80 to the retracted position. So long as stop 80 remains in the stopping position, it prevents rocker member 58 from moving under the yieldable bias of spring 68 to an advanced position as shown in Fig. 3. When stop 80 is retracted, rocker member 58 is permitted to pivot in the counterclockwise direction under the control of a continuously rotating cam 100 whereby the respective pair of opposed arms 52 will be actuated to effect shifting of the then associated code wheel 22.

Cam 100 acts, not only to control the movement of rocker member 58 in the counterclockwise direction under the bias of spring 68, but also to effect movement of the rocker member in the clockwise direction against the bias of spring 68 and to free abutment 74 from the nose 78 of stop 80 prior to and during retraction of the latter; all as will be more particularly described hereinafter.

It will be noted that the cams 100 of all of the individual motion-translating mechanisms 54 are fixedly mounted on a common rotatable cam shaft 102. Cam shaft 102 is continuously driven in timed relation to the movement of successive code wheel-carrying shafts 20 past code wheel-shifting members 36, 38. In this regard, cam shaft 102 carries a gear 106 driven by a belt 108, the latter being positively driven, through means not shown, by endless conveyor 10.

The cam 100 of each of the individual motion-translating mechanisms 54 cooperates with a cam follower roller 104 rotatably mounted on the pin 56 carried by rocker member 58. Cam 100 provides what will hereinafter be referred to as a high surface portion 110 and a low surface portion 112. High surface portion 110 has a substantially constant radius of curvature greater than that of any segment of low surface portion 112. The radius of curvature of low surface portion 112 gradually decreases from each end of this portion to a minimum at the lowest point 114 of this cam surface portion.

With the parts in the positions shown in Fig. 2, stop 80

is in stopping position with nose 78 thereof engaging abutment 74 of rocker member 58 to retain the latter in said normal position against the yieldable bias of spring 68. Also, the lowest point 114 of low surface portion 112 of cam 100 is next adjacent but spaced from cam follower roller 104. With rotation of cam 100, no movement of the cam follower 104 results until slightly before the end of low cam surface portion 112 comes next adjacent the cam follower roller. At this point low cam surface portion 112 comes into engagement with the cam follower roller. During the comparatively slight amount of rotation of cam 100 from this point until high cam surface portion 110 reaches the cam follower roller, cam 100 moves the cam follower roller 104 slightly to the right as viewed in Fig. 2. This effects a slight clockwise movement of rocker member 58 with concomitant movement of abutment 74 away from the nose of stop 78 to provide a gap or space therebetween. While cam follower roller 104 is engaged by high cam surface portion 110, the latter retains rocker member 58 in this slightly moved position thereby maintaining the space between nose member 78 and abutment 74, all as shown in full lines in each of Figs. 4 and 7.

Assuming that a respective code wheel is to be shifted from its home position to its alternate position when the next respective code wheel is presented to the code wheel-shifting members 36, 38, stop 80 will be retracted, from the full-line to the broken line non-stopping position as shown in Figs. 4 and 7, by solenoid 90 while nose 78 is spaced from and thereby free of abutment 74. Consequently, no wear or friction between abutment 74 and nose 78 takes place when stop 80 is retracted. After the stop is retracted, the low surface portion 112 of cam 100 comes into engagement with cam follower roller 104 with the result that cam 100 controls movement of the rocker member from said normal to said advanced position under the bias of spring 68. It is to be noted that solenoid 90 remains energized until abutment 74 moves to the right past the outer end of nose 78, after which the solenoid is de-energized whereby spring 84 biases the nose against the distal end of the rocker member. Rocker member 58 will be in fully advanced position when the lowest point 114 of cam 100 engages cam follower roller 104. This condition is depicted in full lines in Figs. 3 and 7. Continued rotation of cam 100 results in clockwise movement of rocker member 58 against the bias of spring 68 until abutment 74 moves to the left just past the outer end of nose 78 whereupon the nose moves, under the bias of spring 84, into engagement with shoulder 76 of the rocker member whereby stop 80 is again in said stopping position. At this point, cam 100 will again be in the rotational position slightly before the end of low cam surface portion 112 comes next adjacent cam follower roller 104. With further rotation of cam 100 high cam surface 110 effects a slight movement of abutment 74 away from nose 78, again freeing the stop from the rocker member. High cam surface portion 110 will again maintain the space between abutment 74 and nose 78 of rocker member 58.

Assuming that a respective code wheel is not to be shifted from its home position to its alternate position when the next set of code wheels is presented to code wheel-shifting members 36, 38, solenoid 90 will not retract stop 80 from its stopping position. The result will be, of course, that rocker member 58 will move abutment 74 into engagement with nose 78 thus closing the space therebetween as low surface portion 112 of the cam 100 moves along cam follower roller 104. Cam 100 which would otherwise have controlled movement of rocker member 58 to the advanced position if stop 80 had been retracted, instead moves out of engagement with cam follower roller 104 while the rocker member is retained in the normal position by the stop. The respective mov-

able parts will then again be in the positions as shown in Fig. 2.

The embodiment of the invention as shown in the drawings includes means providing for the adjustment of the size of the above-described space between abutment 74 and nose 78 which exists before and during retraction of stop 80. Referring particularly to Figs. 7 and 8, the shaft 82 about which stop 78 pivots is carried by an adjustable mounting member 116 which, in turn, is pivotally mounted on a pin 118 fixedly carried by supporting plate member 62. Mounting member 116 provides a slightly elongated aperture 120 through which a bolt 122 extends into threaded engagement with a nut 124. It will be apparent that by pivotally adjusting member 116 about pin 118, nose 78 of stop 80 will be correspondingly adjusted toward or away from abutment 74 of rocker member 58 when the latter is in said normal position. Member 116 is secured in adjusted position by tightening down bolt 122.

It will be clear from the above that retraction of each stop 80, when it occurs, always does so while spaced from and free of the respective abutment 74. Taking a speed of 85 sets of code wheels per minute being moved past the code wheel-shifting members 36, 38, it will be realized that the elimination of wear on the abutment and nose of the stop as afforded by the invention becomes a significant factor. Also, it is a known characteristic of solenoids that the farther the plunger is pulled into the solenoid, the stronger is the force exerted on the plunger. The force initially exerted on the plunger when the solenoid is energized is therefore at a minimum, but this factor is rendered inconsequential by the instant invention because all friction between the abutment and stop is eliminated and the only significant force to be overcome by the solenoid is that offered by comparatively light spring 84.

It will be understood that selective energization of each of solenoids 90 will be effected (by means not shown since it forms no part of the instant invention) in timed relation with the continuous movement of successive sets of code wheels past code wheel shifting members 36, 38.

Dimensions of certain of the parts as shown in the drawings have been slightly modified for the purposes of clarity of illustration.

Since many changes could be made in the embodiment of the invention as particularly described and shown herein without departing from the scope of the invention, it is intended that this embodiment be considered as exemplary and that the invention not be limited except as warranted by the following claims.

What is claimed is:

1. In a device for effecting shifting of a code wheel from a home position to a position adjacent said home position; diametrically opposed rocker fingers engaging one side of the code wheel, a motion-translating element having one end linked to each rocker finger, means to urge the motion-translating element to a finger rocking position, a stop pawl engaging an abutment end of said motion-translating element to retain same in a non-operating position, a selectively controlled solenoid connected to said stop pawl, and means coacting with the motion-translating element to effect freedom of movement of the stop pawl before solenoid operation thereof, and to further control the movement of the motion-translating element and associated rocker fingers.

2. In a device for effecting shifting of a code wheel from a home position to a position adjacent said home position; diametrically opposed rocker fingers engaging one side of the code wheel, a rocker member having one end linked to each rocker finger, means to urge the rocker member to a finger rocking position, a stop pawl engaging an abutment end of said rocker member to retain same in a non-operating position, a selectively controlled solenoid connected to said stop pawl, and means coacting with the rocker member to effect freedom

of movement of the stop pawl before solenoid operation thereof, and to further control the rocking movement of the rocker lever and associated rocker fingers.

3. In combination: a motion-translating element yieldably biased for movement from a normal position to an advanced position; said motion-translating element providing an abutment, a stop engageable with said abutment for retaining said motion-translating element in said normal position, selectively operable means for retracting said stop to permit said movement of the motion-translating element under said yieldable bias, and means to free said abutment from engagement with said stop before the latter retracts, said last-named means permitting said movement of the motion-translating element after retraction of said stop.

4. In combination: a motion-translating element yieldably biased for movement from a normal position to an advanced position; said motion-translating element providing an abutment; a stop engageable with said abutment for retaining said motion-translating element in said normal position; selectively operable means for retracting said stop to permit said movement of the motion-translating element under said yieldable bias; and means to retain said abutment out of engagement with said stop during retraction of the latter and, after retraction of said stop, to permit said movement of the motion-translating element under said yieldable bias.

5. In combination: a rocker member pivotally supported intermediate the ends thereof, an abutment at one end of the rocker member, a releasable pawl movable into a stop position for engagement with said abutment, means yieldably urging the abutment toward engagement with said pawl when the latter is in said stop position, selectively operable means for retracting said pawl from said stop position, said urging means effecting a force whereby the opposite end of the rocker member will be rocked after the pawl is retracted from said stop position, and means to free the abutment from engagement with the pawl before retraction of the pawl is effected, said latter means also permitting said rocking of the opposite end of the rocker member after retraction of the pawl.

6. In combination, a rocker member pivotally supported intermediate the ends thereof, means yieldably biasing said rocker member for rocking movement from a normal position to an advanced position, an abutment carried by said rocker member, a stop yieldably biased to a stopping position for engagement with said abutment thereby to retain said rocker member in said normal position, selectively operable electromagnetic means for retracting said stop from said stopping position, and a continuously rotatable cam operatively associated with said rocker member to retain said abutment out of engagement with said stop during retraction of the latter, and, after retraction of said stop, to permit said movement of the rocker member under said yieldable bias.

7. A device for selectively shifting code members to a coded location and comprising, in combination: a motion-translating element yieldably biased for movement from a normal position to an advanced position; said motion-translating element being operatively associated to effect shifting of one of said code members upon said movement from the normal position to the advanced position;

said motion-translating element providing an abutment; a stop engageable with said abutment for retaining said motion-translating element in said normal position; selectively operable means for retracting said stop to permit said movement of the motion-translating element under said yieldable bias; and means to retain said abutment out of engagement with said stop during retraction of the latter, and, after retraction of said stop, to control said movement of the motion-translating element under said yieldable bias thereby effecting the shifting of one of said code members to said coded location.

8. A device for selectively shifting code elements to a coded location, said device comprising, in combination: a code element shifting member; a motion-translating element operatively connected for actuating said code element shifting member upon movement of the motion-translating element from a normal position to an advanced position; means yieldably biasing said motion-translating element to said advanced position; an abutment carried by said motion-translating element; a stop yieldably biased to a position for engagement with said abutment thereby to retain said motion-translating element in said normal position; selectively operable electromagnetic means for retracting said stop to permit said movement of the motion-translating element to said advanced position; and a continuously rotatable cam operatively associated with said motion-translating element to free said abutment from engagement with said stop before the latter retracts, then to permit said movement of the motion-translating element to said advanced position after retraction of said stop, and then to move said motion-translating element back to said normal position.

9. A device for selectively shifting code elements to a coded location, said device comprising, in combination: a plurality of pairs of opposed fingers, each of said pairs of fingers being arranged for individually shifting one of said code elements when actuated; a rocker member operatively connected for actuating each of said pairs of fingers upon movement of the respective rocker member from a normal position to an advanced position; means yieldably biasing each of said rocker members to said advanced position; an abutment carried by each of said rocker members; a stop yieldably biased to a position for engagement with each of said abutments thereby to retain the respective rocker member in said normal position; selectively operable electromagnetic means for retracting each of said stops to permit said movement of the respective rocker member to said advanced position; and a continuously rotatable cam operatively associated with each of said rocker members to free the respective abutment from engagement with the respective stop before the latter retracts, then to permit said movement of the respective rocker member to said advanced position after retraction of the associated stop, and then to move the associated rocker member back to said normal position.

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