

April 5, 1966

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3,244,368

COUNTER RESET MECHANISM

Filed July 21, 1964

4 Sheets-Sheet 1

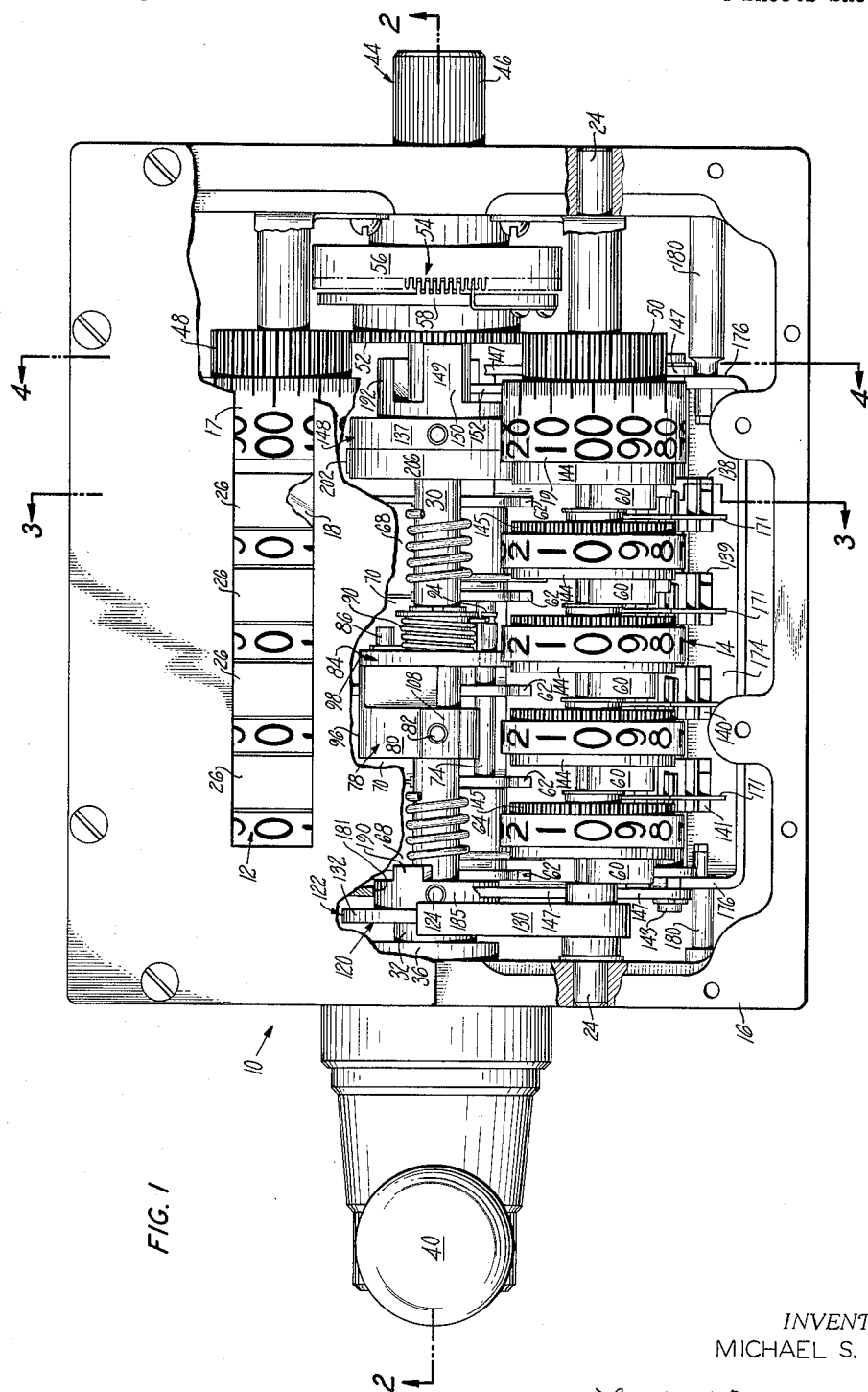


FIG. 1

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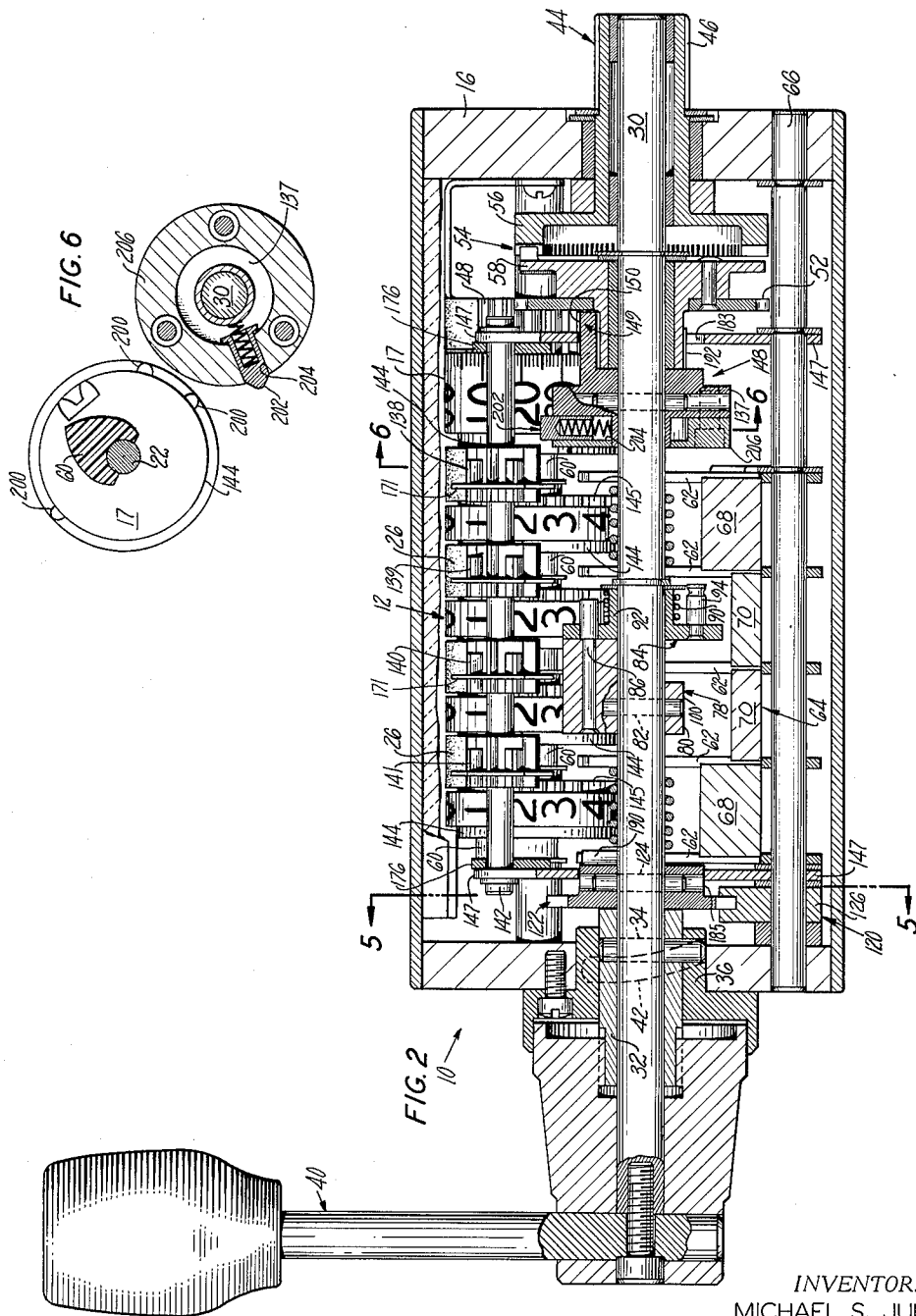
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COUNTER RESET MECHANISM

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4 Sheets-Sheet 2



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4 Sheets-Sheet 3

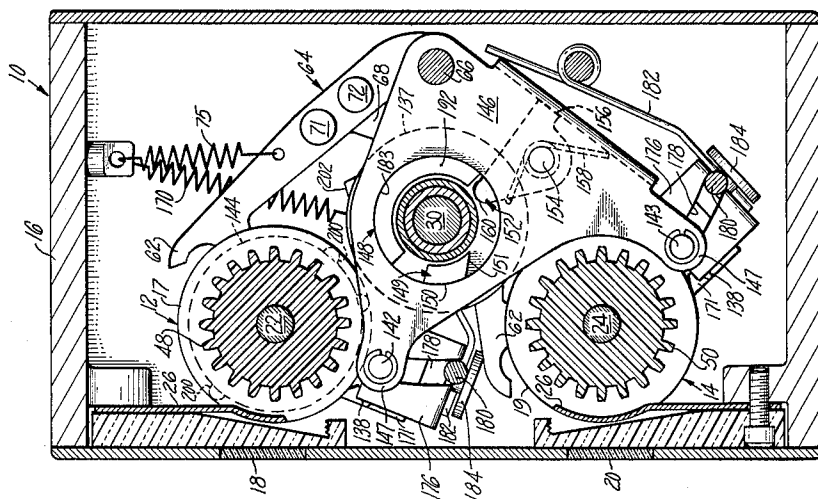


FIG. 4

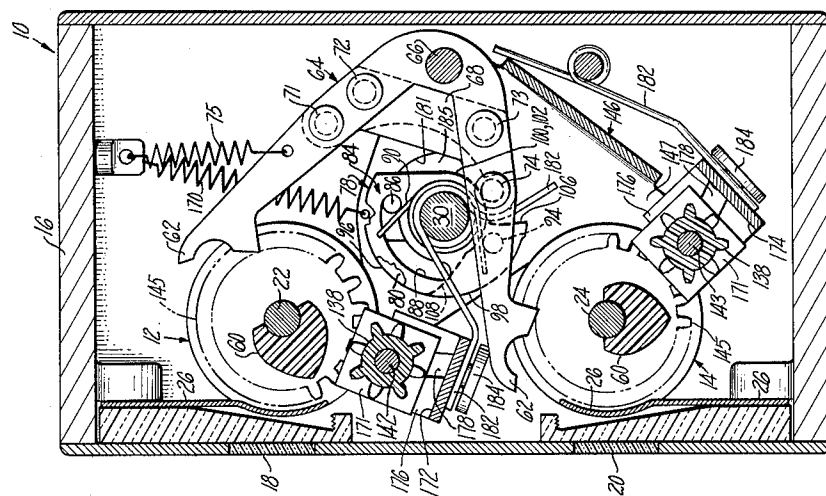


FIG. 3

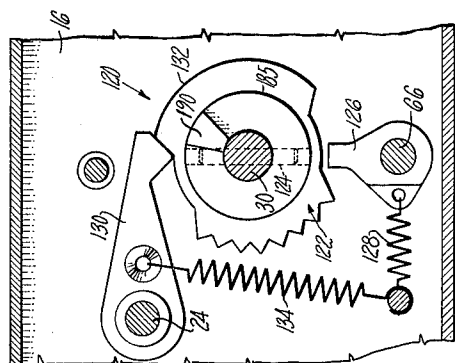


FIG. 5

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4 Sheets-Sheet 4

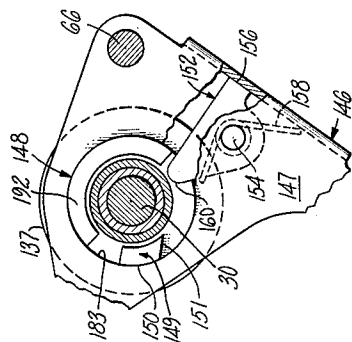


FIG. 9

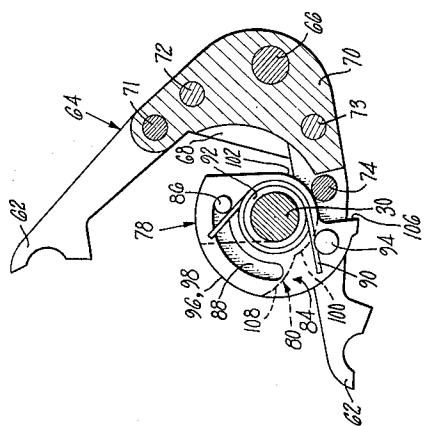


FIG. 8

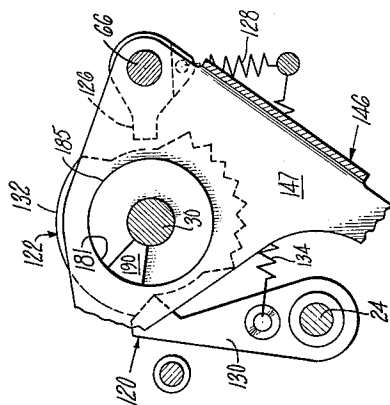


FIG. 7

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3,244,368

COUNTER RESET MECHANISM

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Filed July 21, 1964, Ser. No. 384,104
17 Claims. (Cl. 235-144)

The present invention relates to counters and in particular to a mechanism for resetting the counter wheels of a counter.

It is a principal aim of the present invention to provide a new and improved reset mechanism of the type having reset cams associated with the counter wheels and reset fingers engageable with the cams for resetting the counter wheels. In the usual reset mechanism of this type, the counter transfer pinions are withdrawn from their normal positions in operative association with the counter wheels to disconnect the counter wheels for resetting and are returned to their normal positions after the wheels have been reset. It is accordingly an aim of the present invention to provide an improved mechanism for withdrawing and returning the transfer pinions in timely relationship with the resetting of the counter wheels.

It is another aim of the present invention to provide a new and improved arrangement for angularly aligning the withdrawn transfer pinions for appropriate operative reassociation with the counter wheels.

It is a further aim of the present invention to provide a new and useful arrangement for locking the transfer pinions in their normal positions in operative association with the counter wheels and which provides for timely release of the transfer pinions for withdrawal thereof during the resetting of the counter wheels.

It is another aim of the present invention to provide a new and improved reset mechanism of the type described for timely withdrawing the transfer pinions and for resetting the counter wheels and which provides for returning the transfer pinions into operative association with the counter wheels after the counter wheels have been fully reset by the reset fingers and while the reset fingers are in engagement with the reset cams.

It is another aim of the present invention to provide a counter reset mechanism of the type described for timely disengaging the counter drive to the lowest order counter wheel and for re-engaging the counter drive after the counter wheels are fully reset.

It is a further aim of the present invention to provide a new and useful counter reset mechanism of the type described for preventing "dead center" engagement by the reset fingers with the reset cams and for preventing dead center engagement during the withdrawal and angular alignment of the transfer pinions for operative reassociation with the counter wheels.

It is an other aim of the present invention to provide a new and improved counter reset mechanism for a pair of associated counters for timely disengaging and re-engaging the drive to the lowest order counter wheels of the counters and for resetting the counters.

It is a further aim of the present invention to provide a new and improved counter reset mechanism of the type described for a pair of associated counters for preventing dead center engagement by the reset fingers with the reset cams of the counters and for preventing dead center engagement during the withdrawal and angular alignment of the transfer pinions for operative reassociation with the counter wheels.

Other objects will be in part obvious and in part pointed out more in detail hereinafter.

The invention accordingly consists in the features of construction, combination of elements and arrangement of

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parts which will be exemplified in the construction hereafter set forth, and the scope of the application of which will be indicated in the appended claims.

In the drawings:

FIG. 1 is a longitudinal view, partly broken away and partly in section, of a counting device incorporating an embodiment of the present invention;

FIG. 2 is a longitudinal section view of the counting device;

FIG. 3 is a transverse section view of the counting device taken substantially along line 3-3 of FIG. 1;

FIG. 4 is a transverse section view of the counting device taken substantially along line 4-4 of FIG. 1;

FIG. 5 is a partial transverse section view of the counting device taken substantially along line 5-5 of FIG. 2;

FIG. 6 is a partial transverse section view of the counting device taken substantially along line 6-6 of FIG. 2;

FIGS. 7, 8 and 9 are partial transverse section views, partly broken away and partly in section, showing portions of the counting device in one operative position thereof.

Referring now to the drawings in detail, a counting device, generally denoted by the numeral 10, incorporating an embodiment of a reset mechanism of the present invention is shown with a pair of counters 12, 14 mounted within a housing 16 having suitable viewing windows 18, 20. Each of the counters is shown having five counter wheels with the lowest order counter wheels 17, 19 embellished to register in increments of 1 through 100, the counting device shown having particular utility in combination with a machine tool and with the counters connected for operation in opposite counting directions. The counter wheels are rotatably mounted on parallel counter shafts 22, 24 mounted within the housing 16 and with arcuate masking fingers 26 positioned between the counter wheels.

A counter reset shaft 30 is mounted in the housing 16 parallel to and intermediate of the counter shafts 22, 24, and a sleeve 32 (FIG. 2) fixed to the reset shaft 30 by a pin 34 rotatably supports one end of the reset shaft 30 within a bushing 36 fixed to the housing. The bushing 36 is provided with a camming slot receiving a radially projecting end of the pin 34 and is thereby adapted to limit angular freedom of movement of the reset shaft 30, to approximately 155° in the counting device shown, and to provide for controlled axial displacement of the reset shaft concomitant with the angular displacement thereof, accomplished in the counting device shown by a manual reset lever 40 fixed to the reset shaft 30. The opposite end of the reset shaft is rotatably mounted within a drive sleeve 44 revolvably mounted but axially retained on the housing 16. The drive sleeve 44 is serrated at 46 for receiving a counter drive gear (not shown) and is connected to the counters 12, 14 by a drive train which includes a pair of driven gears 48, 50 fixed to the lowest order counter wheels 17, 19, respectively, a drive gear 52 in mesh therewith, and a clutch 54. The clutch 54 comprises a driving clutch element 56 on the drive sleeve 44 and a driven clutch element 58 fixed to the drive gear 52 and revolvably mounted but suitably axially retained on the reset shaft 30. Accordingly, upon actuation of the reset lever 40 the driven clutch element 58 will be axially displaced with the reset shaft 30 to disengage the clutch 54 and therefore the drive train to the counters 12, 14, the cam slot 42 being preferably contoured to axially displace the reset shaft for disengaging the clutch 54 during the first 45° of angular displacement thereof from its normal position shown in the drawings, in the counterclockwise direction as seen in FIGS. 3-5.

For resetting the counters 12, 14, each of the counter wheels thereof is provided with reset cams 60, shown

to be of generally heart shape, and engageable by the reset fingers 62 of a reset yoke 44 for zeroizing the counter wheels. The yoke 44 is pivotally mounted on a shaft 66 mounted on the housing 16 parallel to the counter shafts 22, 24. The reset fingers 62 are axially spaced in accordance with the axial spacing of the reset cams 60 by spacer blocks 68, 70 positioned between the fingers and secured thereto by rivet pins 71-74. The fingers 62 are maintained in their normal or withdrawn positions shown in FIGS. 3 and 4 by a suitable tension spring 75 and the yoke is pivoted in the counterclockwise direction against the bias of the spring 75 by operation of a cam mechanism 78 which functions to provide for timely and positive resetting of the counter wheels.

Referring now to FIGS. 2 and 3 in particular, the cam mechanism 78 comprises a primary cam 80 fixed to the reset shaft 30 by a pin 82 and a secondary or floating cam 84 rotatable on the reset shaft and having an angular freedom of movement relative to the cam 80 limited to approximately 90° by a pin 86 fixed to the primary cam 80 and received in a slot 88 in the secondary cam 84. The secondary cam 84 is retained in its normal or extended position shown in FIG. 3 by a torsion spring 90 encircling a hub 92 of the secondary cam 84 and having ends engaging the pin 86 and a pin 94 fixed to the secondary cam 84.

The primary and secondary cams have outer partially cylindrical edge portions 96, 98 of equal radius engageable with the pin 74 for maintaining the reset fingers in engagement with the reset cams 60 after the counter wheels are fully reset for retaining the wheels in the reset or zero position. The primary and secondary cams additionally have partially cylindrical edge portions 100, 102 of substantially reduced radius which are engageable by the pin 74 to limit the withdrawal movement of the reset fingers when the reset shaft 30 is in its normal position shown in FIG. 3. Intermediate the cam portions 98, 102 of the secondary cam 84 is a generally radial shoulder 106 engageable by the pin 74 upon rotation of the reset shaft 30 in the counterclockwise direction as seen in FIG. 3 to angularly displace the secondary or floating cam 84 on the reset shaft. An intermediate cam edge 108 on the primary cam 80 is thereby presented for engagement by the pin 74 for pivoting the reset fingers 62 for resetting the counter wheels. In the embodiment shown, the intermediate cam edge 108 is adapted to contact the pin 74 after approximately 93° of angular displacement of the reset shaft and to fully reset the counter wheels during the subsequent 45° of angular displacement of the reset shaft. After the counter wheels are fully reset and the pin 74 is riding on the partially cylindrical edge portions 96, 98, the secondary cam 84 is free to rotate under the bias of the torsion spring 90 to its fully extended position. Accordingly when the reset shaft is subsequently returned to its normal position, in the clockwise direction as seen in FIGS. 3 and 4, the partially cylindrical edge portion 98 of the secondary cam will function to maintain the reset fingers 62 in engagement with the reset cams 60 until just a few degrees of angular displacement of the reset shaft 30 prior to re-engagement of the clutch 54.

As best seen in FIG. 5, a bidirectional ratchet mechanism 120 is provided for ensuring full forward angular displacement of the reset shaft 30, in the counterclockwise direction as seen in FIG. 5, before it is returned in the opposite angular direction to its normal position. The ratchet mechanism 120 includes a ratchet tooth sector 122 fixed to the reset shaft 30 by a pin 124 and a ratchet pawl 126 revoluble on the shaft 66 and biased to a neutral position shown in FIG. 5 by a tension spring 128. Additionally, a detent pawl 130 revolvably mounted on the counter shaft 24 and urged by a tension spring 134 into engagement with a cam edge 132 integrally formed with the ratchet sector 122 provides a detent for the angular limit of travel of the reset shaft 30.

The counters 12, 14 are provided with multilobed transfer pinions 138-141 mounted on pinion shafts 142, 143 for generating a transfer between adjacent higher and lower order wheels of the counters. The transfer pinions are shown with eight teeth and in the well-known manner with alternate pinion teeth shortened to enable the alternate long teeth to be engageable with suitable shoulders 144 provided on the counter wheels for locking the transfer pinions against rotation during the angular interval between transfers. The pinion shafts 142, 143 are supported by the arms 147 of a yoke 146 which is pivotally mounted on the shaft 66 so that the pinions may be withdrawn from their operative positions in mesh with the counter wheel drive gears 145 for resetting the counter wheels. For this reason the reset shaft 30 is provided with a yoke pivot control mechanism 148 for timely withdrawing and returning the transfer pinions in sequence with the disengagement of the clutch 54 and the pivotal operation of the reset fingers 62. The control mechanism 148 includes a collar or hub 137 fixed to the reset shaft having an integral axially projecting cam 149 (FIG. 4) with a partially cylindrical edge portion 150 and with an inclined edge portion 151. The inclined edge portion 151 is adapted to timely engage the nose 160 of a link or follower 152 to timely pivot the yoke about the shaft 66 and thereby withdraw the transfer pinions. The link 152 is pivotally mounted on the yoke 146 by a pin 154 and is pivotally urged by a torsion spring 158 to its normal or forward position shown in FIG. 4 with an edge 156 thereof in abutment with the yoke 146. In the present embodiment, the cam 149 is positioned so that withdrawal of the transfer pinions is initiated after approximately 75° of angular displacement of the reset shaft 30 and the pinions are fully withdrawn after approximately 93° of angular displacement of the reset shaft and therefore prior to pivotal actuation of the reset fingers 62. Additionally, after an additional 55° for angular displacement of the reset shaft and therefore after the counter wheels have been fully reset by the reset fingers 62, the nose portion 160 of the link 152 becomes disengaged from the cam edge portion 150 of the cam 149 whereupon a tension spring 170 returns the yoke 146 to its extended or operating position and therefore the transfer pinions 138-141 into mesh with the counter wheel drive gears 145. Consequently, the transfer pinions are returned into operative association with the counter wheel drive gears while the reset fingers 62 are in engagement with the reset cams 60 thereby ensuring retention of the counter wheels in their reset or zero positions. After approximately 155° of forward angular displacement of the reset shaft 30 the shaft is returned in the clockwise direction as seen in FIG. 4 whereupon the cam 149 engages the nose 160 of the link 152 to pivot the link against the bias of the torsion spring 158 and with the yoke 146 remaining in its extended or operating position. When the reset shaft 30 is returned to its normal position the link 152 is released to assume its normal position in abutment with the yoke 146 as shown in FIG. 4.

For aligning the transfer pinions 140 for appropriate noninterfering re-engagement with the counter wheel drive gears 145, the pinions are provided with integral aligning plates or cams 171 intermediate their axial ends having a polygonal peripheral contour or cam edge with a number of sides or lands equal to one-half the number of teeth on the transfer pinions, and in the shown embodiment having a square peripheral contour. The aligning plates 171 are adapted to engage axially extending flat aligning bars 172, 174 upon the withdrawal of the pinions 138-141 thereby aligning the pinions for subsequent re-engagement with the reset counter wheels. The aligning bars 172, 174 are adapted to abut one side of each of the aligning plates 171, the aligning plates 171 being preferably dimensioned to encompass the transfer pinions within their peripheral contours for simplicity of construction. The aligning bars 172, 174 are of generally U-shaped

construction with side flanges 176 for mounting the bars for cooperative withdrawal with the transfer pinions after engagement by the aligning plates, which movement of the aligning bars provides for ensuring appropriate engagement with the aligning plates. The side flanges 176 of the aligning bars are provided with slots 178 which receive pairs of axially aligned guide posts 180 fixed to the housing 16. Torsion springs 182 provide for urging the aligning bars toward the pinions, and the aligning bars are provided with suitable stops 184 engageable with the guide posts 180 for limiting their freedom of movement in that direction. The slots 178 also receive the transfer pinion shafts 142, 143 and the guide posts 180 are positioned substantially the same distance from the pivot axis of the yoke 146 as the transfer pinion shafts 142, 143 such that the path of movement of the aligning bars 172, 174 is substantially in an arc coaxial with the shaft 66. This movement of the aligning bars ensures that the transfer pinions withdraw from the aligning bars 174 in a manner which avoids angular displacement of the transfer pinions on the pinion shafts.

For locking the transfer pinion yoke 146 in its normal or operative position, the arms 147 of the yoke are provided with circular openings 181, 183 coaxial with the reset shaft 30 with the transfer pinions in their normal or operative positions in mesh with the counter wheel drive gears 145. A collar or hub 185 integrally formed with the ratchet sector 122 is received within the opening 181 when the reset shaft 30 is in its normal position to positively retain or lock the transfer pinions in their operative positions. However, when the reset shaft 30 is axially displaced during its initial angular displacement of 45° for disengaging the clutch 54, the hub 185 is withdrawn from the opening 181 to allow for pivotal movement of the transfer pinion yoke 146. A pie-shaped axially projecting hub sector 190 however remains within the circular opening 181 to ensure appropriate realignment of the opening 181 with the hub 185 for subsequent reinsertion of the hub into the opening. The projection 190 is accordingly positioned to allow for pivotal movement of the yoke 146 after approximately 75° of angular displacement of the reset shaft 30, and at the same time to provide for maintaining the opening 181 in alignment with the hub 185 as the reset shaft is returned through its last 45°.

Additionally, as seen in FIG. 4, the yoke operating cam 149 and a semicircular collar or hub 192 formed integrally with the cam 149 are received within the opening 183 for assisting in locking the yoke 146 and therefore the transfer pinions in their operating positions. As with the hub 185, the hub 192 is withdrawn from the opening 183 when the reset shaft 30 is axially displaced during its first 45° of angular displacement, and as with the hub sector 190, the cam 149 is axially dimensioned to remain within the opening 183 to assist in maintaining the opening in alignment for reinsertion of the hub 192.

Referring to FIG. 6, in order to prevent dead center engagement by the reset fingers 62 with the reset cams 60 and to prevent dead center engagement by the aligning plates 171 with the aligning bars 172, 174, abutments or bumps 200 are provided on the lowest order counting wheel 17 of the counter 12. These abutments 200 are engageable by a plunger or actuator 202 reciprocable within a radial slot 204 in a support 206 fixed to the hub 137 and urged outwardly by a suitable compression spring. The actuator 202 has a generally V-shaped nose that is adapted to move through an arc adjacent the counter wheel 17 after the clutch 54 is disengaged and before the transfer pinions are retracted and, accordingly, between 45° and 75° of angular displacement of the reset shaft. The abutments 200 are angularly located on the lowest order counter wheel 17 so that the actuator 202 will engage them and thereby angularly displace the counter wheel 17 when any of the aforementioned dead center relationships are present. In the counting device shown three abutments

200 are provided; one abutment being provided for preventing dead center engagement with the reset cams 60 on the counter wheels 17, 19, respectively, and the remaining two abutments being provided for displacing the counter wheels 17, 19 out of their transfer interval for preventing dead center engagement by the aligning plates of the transfer pinions 138 with the aligning bars 172, 174, respectively. Dead center engagement by the remaining transfer pinions 139-141 with the aligning bars 172, 174 is as a result prevented as such dead center engagement is possible only when the aligning plates on the transfer pinions 138 are in approximately dead center relationship with the aligning bars 172, 174. Also, by positioning the reset cams on the counter wheels such that dead center engagement therewith by the reset fingers is possible only during the transfer interval of the wheels, the abutments 200 providing for displacing the lowest order counter wheels 17, 19 out of the transfer interval also provide for preventing dead center engagement with the reset cams of the remaining counter wheels.

Thus it can be seen that with the counter reset mechanism of the present invention there is accomplished in timely sequence: (1) disengagement of the counter drive trains, (2) angular displacement of the lowest order counter wheels where necessary to avoid dead center engagement during the subsequent resetting of the counter wheels and alignment of the transfer pinions, (3) withdrawal of the transfer pinions from their normal positions and alignment thereof for reassociation with the counter wheels, (4) resetting of the counter wheels with the reset fingers, (5) returning of the aligned transfer pinions to their normal positions, (6) withdrawal of the reset fingers and (7) re-engagement of the counter drive trains.

As will be apparent to persons skilled in the art, various modifications and adaptations of the structure above described will become readily apparent without departure from the spirit and scope of the invention, the scope of which is defined in the appended claims.

I claim:

1. In a counter having coaxial counter wheels, a transfer pinion shaft, transfer pinions on the transfer pinion shaft having normal positions in operative association with the counter wheels for generating transfers therebetween, and a counter reset mechanism for resetting the counter wheels including means for pivoting the transfer pinion shaft for withdrawing the transfer pinions from and for returning them to their normal positions, and means for angularly aligning the transfer pinions for operative reassociation with the counter wheels, the improvement wherein the angular aligning means comprises polygonal contoured aligning cams on the transfer pinions dimensioned to enshroud the pinions, and aligning bar with an elongated portion extending parallel to the pinion shaft and having a generally flat face engageable by the aligning cams for angular alignment of the pinions, and means for mounting the bar for withdrawal movement with the transfer pinions upon engagement thereby.

2. The improvement of claim 1 wherein the mounting means for the aligning bar provides for substantially pivotal movement thereof coaxial with the pivotal movement of the transfer pinion shaft.

3. The improvement of claim 1 wherein the bar has a pair of side flanges extending transversely of the pinion shaft and wherein the mounting means for the bar comprises a pair of opposed transversely extending slots in the side flanges receiving the pinion shaft therein, fixed guide post means received in the slots, said guide post means and said pinion shaft being substantially equally spaced from the pivotal axis of the pinion shaft, and spring means urging the aligning bar toward the transfer pinions.

4. In a counter having coaxial counter wheels, a transfer pinion shaft, transfer pinions on the transfer pinion shaft having normal positions in operative association with the counter wheels for generating transfers therebetween, and a counter reset mechanism having a reset shaft oper-

able upon angular displacement thereof for pivoting the pinion shaft for withdrawing the transfer pinions from and returning them to their normal positions and for resetting the counter wheels while the transfer pinions are withdrawn, the improvement wherein the counter reset mechanism comprises a yoke supporting the transfer pinion shaft pivotally mounted for withdrawing and returning the pinions, said yoke having a pair of arms with openings therein receiving the reset shaft, means axially displacing the reset shaft upon angular displacement thereof for resetting the counter, and locking means on the shaft received in said openings for locking the transfer pinions in their normal positions and axially displaceable with the reset shaft to release the yoke for pivotal movement.

5. The improvement of claim 4 wherein the locking means includes first portions axially displaceable from said openings respectively for releasing the yoke and second portions axially dimensioned to remain in said openings respectively upon axial displacement of the reset shaft and contoured for realigning the openings with the first portions upon return of the transfer pinions to their normal positions.

6. The improvement of claim 4 wherein the openings are at least partially circular and coaxial with the reset shaft with the transfer pinions in their normal positions, and wherein the locking means comprises at least partially circular collars receivable in the openings respectively with the transfer pinions in their normal positions.

7. In a counter having coaxial counter wheels, a transfer pinion shaft, transfer pinions on the transfer pinion shaft having normal positions in operative association with the counter wheels for generating transfers therebetween, and a counter reset mechanism having a reset shaft operable upon forward and return angular displacement thereof for pivoting the pinion shaft for withdrawing the transfer pinions from and returning them to their normal positions and for resetting the counter wheels while the transfer pinions are withdrawn, the improvement wherein the counter reset mechanism comprises a yoke supporting the transfer pinion shaft pivotally mounted for withdrawing the pinions, a cam on the reset shaft for operating the yoke, a cam follower pivotal on the yoke between a retracted position and an extended operating position engageable by the cam for pivoting the yoke, and spring means urging the cam follower to its extended position, said cam being contoured to engage the cam follower to pivot the yoke upon angular forward displacement of the reset shaft, to release the yoke upon continued forward displacement of the reset shaft and to pivot the cam follower against the spring means upon return angular displacement of the reset shaft.

8. In a counter having coaxial counter wheel, a transfer pinion shaft, transfer pinions on the transfer pinion shaft having normal positions in operative association with the counter wheels for generating transfers therebetween, and a counter reset mechanism including a reset shaft operable upon forward and return angular displacement thereof for pivoting the pinion shaft for withdrawing the transfer pinions from and returning them to their normal positions and for resetting the counter wheels while the transfer pinions are withdrawn, the improvement wherein the counter reset mechanism comprises a pivotally mounted yoke supporting the transfer pinion shaft, spring means urging the yoke in one pivotal direction for returning the transfer pinions to their normal positions, a cam on the reset shaft for actuating the yoke in the opposite pivotal direction for withdrawing the transfer pinions, a cam follower pivotally mounted on the yoke between retracted and extended positions, said cam being contoured to engage the cam follower in its extended position to pivot the yoke for withdrawing the transfer pinions and subsequently release the follower for allowing spring return of the transfer pinions upon forward angular displacement of the reset shaft and upon return angular displacement of the reset shaft to pivot the cam follower to its

retracted position and with the transfer pinions being retained in their normal positions by said spring means.

9. A counter comprising a counter shaft, a plurality of counter wheels on the counter shaft, a pinion shaft, transfer pinions on the pinion shaft having normal positions in operative association with the counter wheels for generating transfers therebetween, a reset shaft in parallel relationship with the counter shaft angularly displaceable between normal and extended positions, a yoke supporting the pinion shaft pivotally mounted between normal and withdrawn positions for withdrawing the transfer pinions from and returning them to their normal positions, said yoke having an enlarged opening receiving the reset shaft, counter driving means including a disengageable clutch mounted coaxially with the reset shaft, locking means on the reset shaft receivable within the yoke opening with the reset shaft in its normal position for locking the yoke against pivotal movement from its normal position, means operable upon angular displacement of the reset shaft from its normal to its extended position to axially disengage the clutch and the locking means, and operable upon angular displacement of the reset shaft from its extended to its normal position to re-engage the clutch and the locking means, reset cams on the counter wheels, pivotally mounted reset finger engageable with the reset cams for resetting the counter wheels, and cam means on the reset shaft operable upon forward angular displacement thereof from its normal to its extended position to pivotally withdraw the yoke, to withdraw the pinions, to pivot the reset fingers into engagement with the reset cams to reset the counter wheels after the clutch is disengaged, and operable upon return angular displacement of the reset shaft from its extended to its normal position to pivot the reset fingers from the reset cams just prior to the re-engagement of the clutch.

10. In a counter having higher and lower order coaxial counter wheels, a transfer pinion having a normal position operably connecting the counter wheels for generating a transfer from the lower order counter wheel to the higher order counter wheel, and a counter reset mechanism including reset cams on the counter wheels, reset fingers operable to engage the reset cams respectively for resetting the counter wheels, and a shaft connected to operate the reset fingers upon angular displacement thereof, the improvement wherein the counter reset mechanism further comprises a rotatable dog operably connected to the shaft for movement through an arc adjacent the lower order counter wheel upon angular displacement of the shaft, and abutment means on the lower order counter wheel engageable by the dog during said movement thereof for angularly displacing the reset cam on the lower order wheel out of dead center relationship with the respective reset finger.

11. In the counter of claim 10 wherein the shaft is connected to withdraw the transfer pinion from and return it to its normal position upon angular displacement of the shaft, wherein the counter reset mechanism further includes means for angularly aligning the transfer pinion for return to its normal position, and wherein the abutment means is engageable by the dog during said movement thereof to angularly displace the transfer pinion to prevent dead center engagement during the angular alignment of the transfer pinion.

12. The improvement of claim 10 wherein the dog is radially reciprocable between extended and retracted positions and further comprising spring means biasing the dog to its extended position.

13. In a counter having a plurality of coaxial counter wheels, a pivotally mounted transfer pinion shaft, coaxial mutilated transfer pinions mounted on the transfer pinion shaft having normal positions in one pivotal position of the transfer pinion shaft operable connecting the counter wheels for generating transfers therebetween, and a counter reset mechanism including a reset shaft, reset cams on the counter wheels, pivotally mounted coaxial

reset fingers operable by the reset shaft for engagement with and withdrawal from the reset cams for resetting the counter wheels, and means operable by the reset shaft for pivotally withdrawing the transfer pinions from and returning them to their normal positions for temporarily disconnecting the wheels, the improvement wherein the transfer pinions have square aligning cam plates intermediate the axial ends thereof dimensioned to enshroud the pinions, wherein the transfer pinion shaft is mounted for pivotal movement independent of the pivotal movement of the reset fingers, and further comprising a bar extending parallel and adjacent to the transfer pinion shaft, said bar having coplanar face portions engageable by the aligning cam plates upon withdrawal of the transfer pinions, means for mounting the bar for withdrawal by the pinions upon engagement thereby, and first and second means operable by the reset shaft including first means operable for pivoting the reset fingers adapted for pivoting the reset fingers for resetting the wheels after withdrawal of the transfer pinions and second means operable for pivoting the transfer pinion shaft adapted for pivoting the transfer pinion shaft to said one pivotal position prior to withdrawal of the reset fingers from the reset cams.

14. In a counter having coaxial counter wheels, a transfer pinion shaft, transfer pinions on the transfer pinion shaft having normal positions in operative association with the counter wheels for generating transfers therebetween, and a counter reset mechanism having a reset shaft angularly displaceable between normal and extended positions for pivoting the pinion shaft for withdrawing the transfer pinions from and returning them to their normal positions and for resetting the counter wheels while the transfer pinions are withdrawn, the improvement wherein the counter reset mechanism comprises camming means for axially displacing the reset shaft upon angular displacement thereof between its normal and extended positions, a yoke supporting the transfer pinion shaft pivotally mounted for withdrawing and returning the pinions, locking means operable by the reset shaft in its normal position for locking the yoke and operable for releasing the yoke upon axial displacement of the reset shaft by the camming means, and aligning means for pivotally aligning the yoke for locking the yoke with the locking means.

15. In a counting device having a counter with a plurality of coaxial counter wheels, a disengageable clutch for operatively engaging and disengaging the drive to the counter, transfer pinions having operative positions in operative association with the counter wheels for generating transfers therebetween, said transfer pinions being adapted to be withdrawn from and returned to their operative positions for resetting the counter wheels, and a counter reset mechanism including reset cams associated with the counter wheels, reset fingers mounted for forward pivotal extension into engagement with the reset cams for resetting the counter wheels, and a reset shaft connected for pivotally extending and withdrawing the reset fingers and for withdrawing the transfer pinions from and for returning them to their operative positions upon forward and return angular displacement of the shaft respectively, the improvement wherein the reset mechanism comprises first rotatable cam means operable by the reset shaft for forward pivotal actuation of the reset fingers after an interval of forward angular displacement of the reset shaft and second rotatable cam means operable by the reset shaft for delaying withdrawal of the reset fingers until after the reset shaft has been at least partially returned through said angular interval, and means operable by the reset shaft for disengaging the disengageable clutch during said interval of forward angular displacement and therefore prior to the forward pivotal actuation of the reset fingers.

fingers after an interval of forward angular displacement of the reset shaft and second rotatable cam means operable by the reset shaft for delaying withdrawal of the reset fingers until after the reset shaft has been at least partially returned through said angular interval, and means operable by the reset shaft for disengaging the disengageable clutch during said interval of forward angular displacement and therefore prior to the forward pivotal actuation of the reset fingers.

16. In a counter having coaxial counter wheels and a counter reset mechanism including reset cams associated with the counter wheels, reset fingers mounted for forward pivotal extension into engagement with the reset cams for resetting the counter wheels, and a reset shaft connected for pivotally extending and withdrawing the reset fingers upon forward and return angular displacement of the shaft respectively, the improvement wherein the reset mechanism comprises first rotatable cam means operable by the reset shaft for forward pivotal actuation of the reset fingers after an interval of forward angular displacement of the reset shaft and second rotatable cam means operable by the reset shaft for delaying withdrawal of the reset fingers until after the reset shaft has been at least partially returned through said angular interval, said second cam means being angularly displaceable with respect to the first cam means for delaying withdrawal of the reset fingers.

17. In a counter having coaxial counter wheels and a counter reset mechanism including reset cams associated with the counter wheels, reset fingers mounted for forward pivotal extension into engagement with the reset cams for resetting the counter wheels, and a reset shaft connected for pivotally extending and withdrawing the reset fingers upon forward and return angular displacement of the shaft respectively, the improvement wherein the reset mechanism comprises first rotatable cam means operable by the reset shaft for forward pivotal actuation of the reset fingers after an interval of forward angular displacement of the reset shaft and second rotatable cam means operable by the reset shaft for delaying withdrawal of the reset fingers until after the reset shaft has been at least partially returned through said angular interval, said first cam means comprising a first rotatable cam with a partially cylindrical cam edge for holding the reset fingers in a forward position and an inclined cam edge for pivotal actuation of the reset fingers to said forward position, and said second cam means comprising a second rotatable cam coaxial with the first cam and angularly displaceable relative thereto, said second cam having a partially cylindrical cam edge of substantially equal radius to said partially cylindrical cam edge of the first cam, and means limiting the angular displacement of the second cam relative to the first cam.

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