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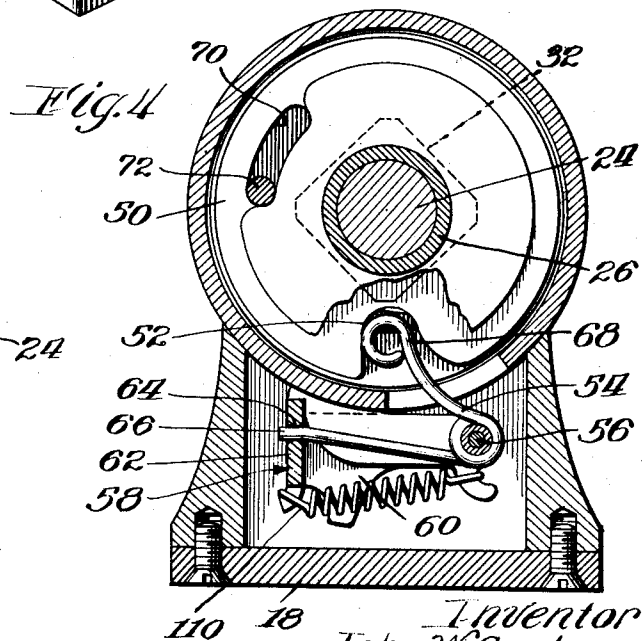
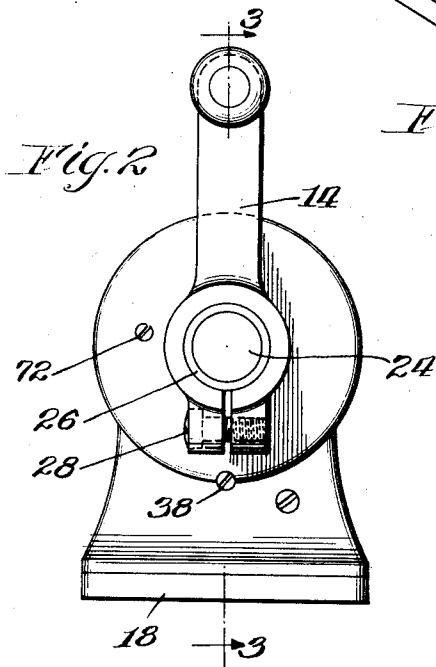
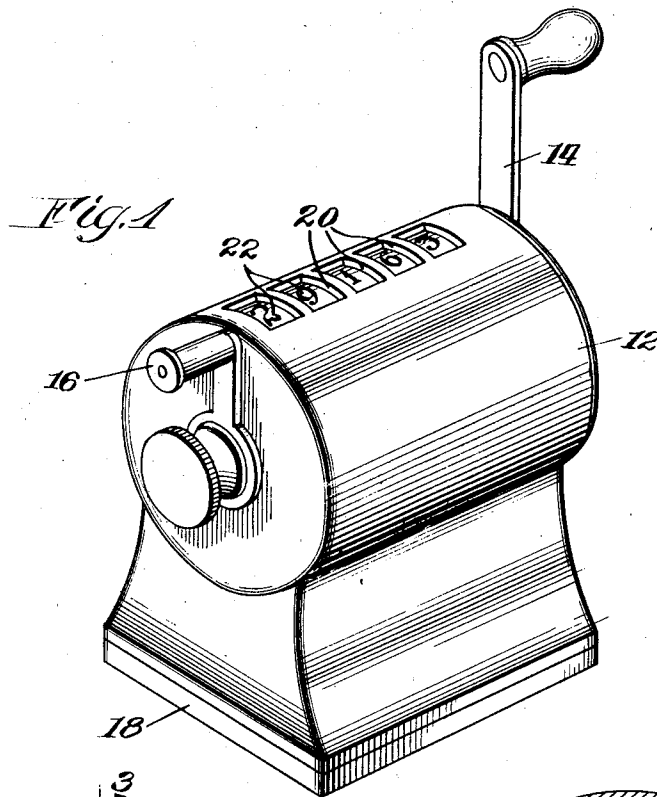
J. W. CARLSON

1,929,622

COUNTER

Filed Nov. 12, 1928

3 Sheets-Sheet 1



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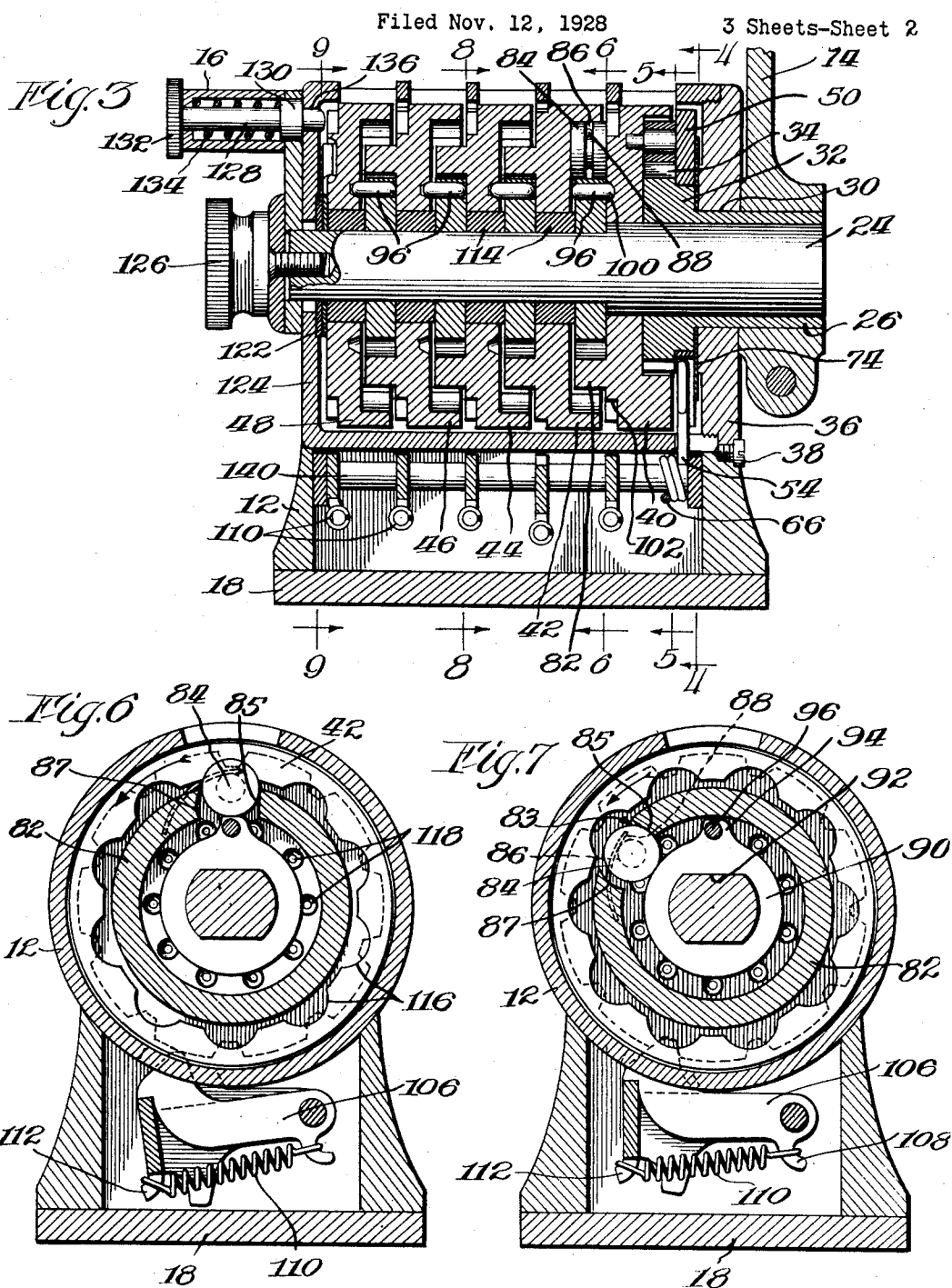
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COUNTER

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3 Sheets-Sheet 2



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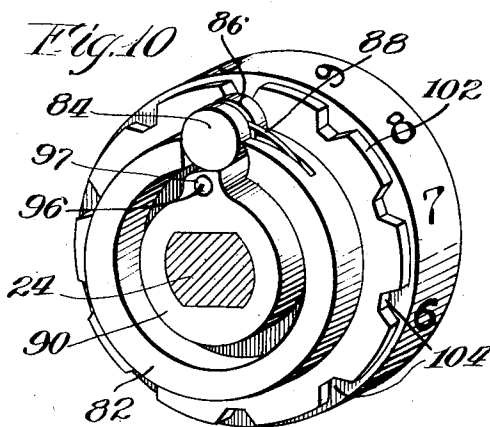
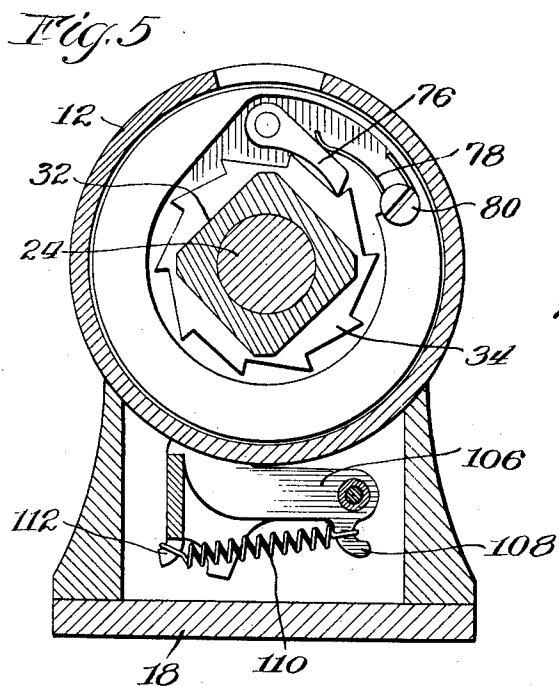
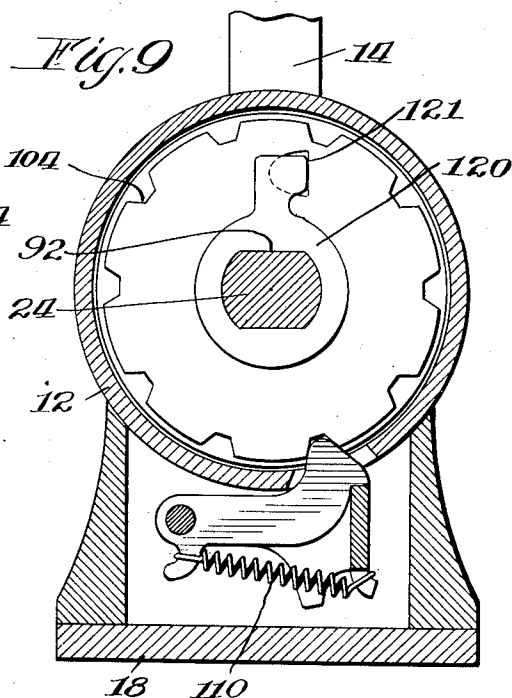
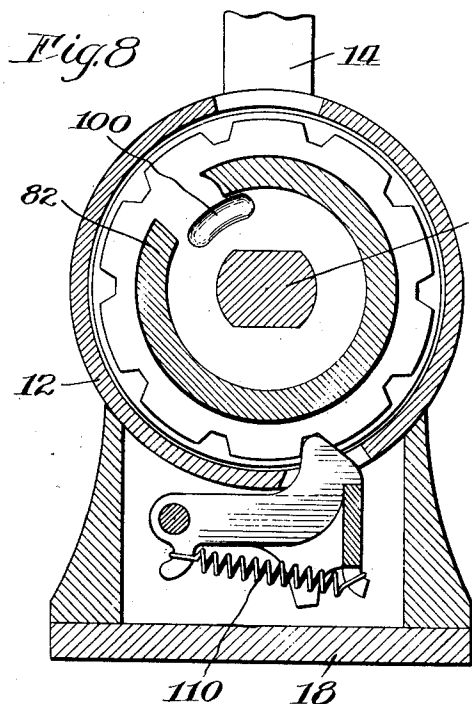
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1,929,622

COUNTER

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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

1,929,622

COUNTER

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Application November 12, 1928
Serial No. 318,805

5 Claims. (Cl. 235—137)

My invention relates generally to improvements in counters or odometers, and more particularly to improvements in transferring and resetting mechanism for devices of this class.

It is an object of my invention to provide an improved counter which is compact and in which the transfer mechanism lies entirely within and between the numeral wheels.

A further object is to provide a counter or numbering device which has improved resetting means.

A further object is to provide a counter having an improved transfer or carry-over mechanism which is positive in operation.

A further object is to provide an improved counter having double lock means to insure against overthrow in transferring or carrying operations.

A further object is to provide improved latching means for aligning the number wheels.

A further object is to provide a device of the above-mentioned class that is simple in construction, positive in operation, and may be economically manufactured.

Other objects and advantages will appear from the following description, reference being had to the accompanying drawings in which

Fig. 1 is a view in perspective of the counter;

Fig. 2 is a right side elevation thereof;

Fig. 3 is a longitudinal vertical sectional view taken on the line 3—3 of Fig. 2;

Fig. 4 is a transverse vertical sectional view on the line 4—4 of Fig. 3;

Fig. 5 is a similar view taken on the line 5—5 of Fig. 3;

Fig. 6 is a similar view on the line 6—6 of Fig. 3, showing the parts in a transferring operation;

Fig. 7 is a view similar to Fig. 6, showing the parts in the positions taken after completion of the transferring operation;

Fig. 8 is a transverse vertical sectional view on the line 8—8 of Fig. 3;

Fig. 9 is a similar view on the line 9—9 of Fig. 3; and

Fig. 10 is a perspective view of a numeral wheel unit and cam mounted on the main shaft, the shaft being shown in cross-section.

Referring to Fig. 1 of the drawings, I have illustrated an embodiment of my invention which comprises generally a case 12, an actuating handle 14, a reset lever 16 and a base 18. The case has eight apertures 20 formed in line with and above the indicia on wheels 22. These apertures may be formed at any desired position around the periphery of the case.

The actuating handle 14 is mounted upon a sleeve 26 which is rotatably carried by the main shaft 24, the hub of the handle being split and being clamped to the sleeve by a screw 28. The sleeve 26 passes through an opening 30 in the end wall 36 of the case and is formed integrally with a squared portion 32 and a ratchet-wheel 34. The end wall 36 is threaded into the case 12 at the right end thereof and is locked against removal by a small screw 38.

Mounted on the shaft 24 inside the case is a series of number or counter wheels, indicated generally as 22, the units, tens, hundreds, thousands, and ten thousands wheels being designated by the reference characters 40, 42, 44, 46 and 48, respectively. It will be understood that any number of numeral wheels may be used to make the counter of any desired capacity.

The units wheel actuating means will now be described. Mounted on the squared portion 32 of the sleeve 26 is a flat disc 50 having a notch like recess 52 in its periphery.

A torsion spring 54 is pivotally mounted on a rod 56 which is rigidly secured in the case and extends from end to end thereof. A ball 58 having arms 60 and a cross bar 62 is also pivotally mounted on said rod and has an aperture 64 to receive one end 66 of the torsion spring 54. The opposite end of the spring is curled to form an eye 68 which lies in the recess 52.

A screw 72 threaded in the end wall 36 has its inner end projecting into an arcuate slot 70 formed in the disc 50 and thus limits the oscillatory movement of the disc 50 and hence the arc of movement of the handle 14. An anti-friction washer 74 is interposed between the end wall 36 and the member 50, and aids in retaining the end 68 of the spring 54 in the recess 52.

The ratchet-wheel 34 cooperates with a pawl 76 (see Fig. 5) which is pivotally mounted on the units wheel 40, the pawl being held against the face of a ratchet-wheel by a spring 78 carried by a screw 80 mounted on the wheel 40. The ratchet-wheel 34 has ten teeth and as the actuating handle is oscillated within the limits defined by the screw 72, the ratchet will carry the units wheel one-tenth of a revolution or 36 degrees and bring the next number on the numeral wheel 40 into registering position with the apertures 20.

The units wheel 40 has on its opposite side an annular flange 82. An opening 83 is provided therein having a straight side 85 and an arcuate side 87. A roller 84 which has a peripheral groove 86 is confined by the sides of the opening 83, and is radially movable, being normally held

inwardly by a small spring 88, one end of which is secured to the flange 82 of the units wheel 40. The roller 84 is held in contact with the face of a cam 90 which is non-rotatably mounted upon the flattened portion 92 of the main shaft 24, and has a hump 94. This hump 94 has a more or less gradual rise on the right side (Fig. 6) and an abrupt fall. The purpose to be fulfilled is that the cam roller 84 may easily ride up the rise of the cam when the numeral wheel 42 is rotating in a counterclockwise direction to attain the flat upper surface and continuing in that direction will rapidly drop down the fall. The fall of the cam as shown to the left side of the hump 94 is given a curvature with a radius equal to that of the roller, so that when the cam 90 rotates in a counterclockwise direction the roller 84 will engage this fall portion of the cam and through it rotate the numeral wheel to reset the counter. From this it may be seen that the roller 84 can only move over the hump 94 of the cam 90 while the numeral wheel 42 is rotating relative to the cam in a counterclockwise direction, but when it is rotated in a clockwise direction the roller 84 will be held by the fall of the cam. This stopping action is utilized in the resetting of the counter to the "0" position. A pin 96 is freely reciprocable in hole 97 drilled through the hump 94. An arcuate groove 100 is formed in the side of the numeral wheel 40 in position so that it may receive the end of the pin 96.

Each of the numeral wheels 22 is provided at its outer periphery at 102 with a series of ten notches 104. Mounted on the transverse rod 56 and in alignment with the notches 104 are detent pawls 106 having ears 108. Springs 110 extend to ears 112 on the bail 58 and tend normally to keep the detent pawls engaged with the notches 104, to aid in alignment of the wheels and to tend to prevent overthrow.

The tens numeral wheel 42 and the other higher order numeral wheels are mounted for rotation upon collars 114 on the main shaft 24 and are substantially similar to numeral wheel 40, except that on their right sides (Figs. 3, 6 and 7) each has a series of arcuate notches 116 in alignment with the rollers 84 of the next lower order numeral wheel, and each also has a series of depressions 118 arranged to register with the left-hand ends of the pins 96 carried by the cams 90. The last numeral wheel is identical except for its left-hand side.

Since the highest order numeral wheel need not initiate a transfer operation, it is not provided with a roller 84 and associated parts, and a cam 90 is unnecessary. Instead, the last numeral wheel 48 has a notch 121 in its left side. A resetting pawl 120 is non-rotatably mounted upon the flattened portion 92 of the shaft 24 between the left side of the counter wheel 48 and an antifriction washer 122 which is positioned adjacent the left end wall 124 of the case 12.

The resetting lever 16 is non-rotatably mounted at the end of the flattened portion 92 of the shaft 24, being detachably secured thereto by a thumb screw 126. The reset lever 16 has a plunger 128 which has an enlarged portion 130 and a handle 132. The end of the plunger 128 is adapted to enter a hole 136 in the side wall 124 when the lever is in normal position and be held therein by a spring 134.

The operation of my improved counter is as follows:

The handle or lever 14 may be oscillated manually or may be connected by a suitable link with

a moving part, the number of operations of which are to be counted. Upon the forward stroke of the operating handle through the arc limited by the screw 72 and slot 70, the end 68 of the spring 54 is cammed to the right (Fig. 4) by the edge of the recess 52, thus tending to move the bail 58 upwardly, thereby increasing slightly the pressure of the pawls 106 upon the notched portion 102.

During this forward movement of the handle the sleeve 26 and ratchet-wheel 34 are rotated counterclockwise (Fig. 5) and through the pawl 76 the units numeral wheel 40 is also rotated counterclockwise through an angle of 36 degrees. Since the indicia of each of the numeral wheels are spaced at intervals of 36 degrees about the peripheral face thereof, such movement will advance the numeral wheel so that the next higher numeral will be visible through the aperture 20.

The handle, the sleeve and other parts associated therewith are returned to normal position by the contraction of the torsion spring 54, the return movement being of course limited by the abutment of the end of the slot 70 with the screw 72. During this return movement the pawl 76 slides over a tooth of the ratchet-wheel 34. During the movement of the units numeral wheel the pawl 106 associated therewith is cammed out of its notch 104 and upon completion of the forward movement enters the next adjacent notch so as to hold the numeral wheel in actuated position.

The transferring operation is as follows:

Assuming that the units wheel has advanced to register "9" and that the remaining wheels stand at "0", upon the forward actuation of the operating handle 14, the roller 84 associated with the units numeral wheel 40 will ride upwardly on the convex face of the hump 94 of the cam 90 to the position in which it is shown in Figs. 3, 6 and 10. In this position the roller will be forced against the tension of its spring 88 into one of the arcuate notches 116, thus coupling the units wheel to the tens wheel. This coupling is maintained while the units wheel moves from the "9" to the "0" position; that is, through an angle of approximately 36 degrees, thereby to advance the tens wheel from "0" to "1". During the latter part of this movement the roller 84 will be forced inwardly along the concave decline of the hump 94 and out of the notch 116 in the tens wheel.

All of the numeral wheels are normally locked to their associated cams 90 by means of the pins 96 and therefore the tens wheel must be released to permit the transfer operation. This is accomplished in the following manner:

The arcuate groove 100 of the units numeral wheel 40 lies adjacent the pin 96 associated with the lowest order cam 90 when the units numeral wheel is effecting a transfer to the tens wheel. The pin 96 may thus be cammed to the right (Fig. 3) out of the depression 118 in the tens wheels and thereby permit rotation of the latter wheel together with the units numeral wheel 40. As the units numeral wheel completes the transferring operation, the pin 96 is cammed out of the groove 100 and moved to the left into the next depression 118 in the tens wheel, thereby again rigidly locking the tens wheel against movement relative to its cam.

The transfer from the tens to the hundreds and between all the other higher orders is effected in a similar manner.

When it is desired to reset the counter, the plunger 128 is removed from the hole 136 and the resetting lever rotated clockwise (Figs. 1 and 9), thus rotating the shaft 24, the cams 90 and the resetting pawl 120. As the cams are rotated the numeral wheels which happen to be locked to the cams by means of their pins 96 will be rotated with the cams. When, however, the units numeral wheel passes from "9" to "0" its groove 100 permits the pin 96 adjacent thereto to move into the groove and thus release the tens wheel for movement relative to the adjacent cam 90. The cam 90 will then rotate relative to the tens wheel until the hump on the cam "picks up" the wheel through engagement of the concave face of the hump 94 with the roller 84. The roller 84 is thus forced against the concave side 87 of the opening 83 in the flange 82 and forms a coupling between the cam and the numeral wheel 42. Thereafter the tens numeral wheel will continue to be rotated by the cam until it reaches the "0" position, when the pin associated with the hundreds numeral wheel will be cammed to the right to permit the cam to rotate relative to the hundreds wheel until its roller 84 is "picked up" by the hump 94 of its associated cam as previously described. The thousands numeral wheel 46 will be reset in the same manner.

From the above description it will be apparent that in order to reset the counter having a number such as 1258, the resetting lever must be rotated four complete turns in order to allow the cams to pick up each of the four number wheels. It is believed clear that the first number wheel picked up by the cam is the units number wheel, and it is rotated through a sufficient turn to bring the "0" number to an upper position, at which time its groove permits the pin adjacent to be moved thereinto, thus releasing the tens wheel for rotary movement from whatever number it is set until the "0" number thereon reaches an upper position in alignment with the "0" number on the units number wheel. A third rotation of the resetting lever in a similar manner brings the "0" on the hundredths number wheel into alignment with the zeros upon both the tens and units number wheels, and a fourth rotation of the resetting lever brings the "0" on the thousandths number wheel into alignment with the "0" on other wheels. It is of course understood that to set a number such as 1258, the units number wheel will be rotated four times.

My invention further contemplates the omission of the pins 96 which comprise an overthrow preventing mechanism. By the omission of the pins 96, the resetting of my improved device is simplified, and is accomplished as follows: The resetting lever is rotated clockwise, thus rotating the shaft 24, the cams 90 and the resetting pawl 120 (for the ten thousandths numeral wheel). As the cams are rotated, the hump on each cam associated with a number wheel will pick up the roller 84, pressing it against the concave portion 87 of its respective numeral wheel. Due to the fact that the roller 84 is positioned with respect to the numbers on each numeral wheel in exactly the same place on each numeral wheel, the numeral wheels will be picked up from whatever position they are in and within one complete turn, each numeral wheel will have its numbers lining up with the numbers on each adjacent numeral wheel, or all of the zeros will be in alignment, all of the ones, etc.

The reset lever 14 and its associated parts is so positioned with respect to the cams and rollers

that in a vertical position of the lever a row of zeros will appear through the openings 20 of the housing. Thus, it can readily be seen that only a complete clearing of the machine will allow the reset lever to be locked into position and allow the machine to be in an operative position.

Since there is no cam and roller associated with the highest order numeral wheel 48, separate means must be provided to return this wheel to "0" position. This means comprises the reset pawl 120, the end of which is resiliently pressed against the left-hand side of the numeral wheel 48 and as the pawl is rotated clockwise (Fig. 9) the end will engage in the notch 121 of the wheel and rotate it to "0" position. Thus it will be seen that all of the numeral wheels, including the last numeral wheel 48, can be returned to a zero setting by one complete revolution of the reset lever by the omission of pins 96, or, if as shown in the drawings the overthrow preventing pins are included in the assembly, four complete turns of the resetting lever 14 are necessary to reset the machine. In reality, numeral wheel 48 will be reset four times during this operation.

During this resetting operation the detent pawls 106 are resiliently held against the notched portions 102 of the numeral wheels so as to provide a frictional drag to insure the proper operation of the resetting means. The pawls will also align the numeral wheels in exact "0" position upon completion of the resetting operation.

From the above description it will be seen that I have provided an extremely compact counter, in which the transferring mechanism lies entirely within and between the numeral wheels. The transfer mechanism is interlocked so that the numeral wheels are held stationary except when they are to be actuated, thus insuring perfect registration and eliminating the possibility of overthrow. In other respects my improved counter is simple and effective in operation. It comprises a small number of parts which may be easily assembled and economically manufactured.

It will be understood by those skilled in the art that the counter of my invention may readily be used as an odometer or revolution counter or for any other similar purpose and that the reciprocating actuating lever 14 may be omitted and the counter driven directly by rotation of the ratchet-wheel 32 through the sleeve 26 thereof. In the latter case the plate 50 is removed so as to prevent interference by the spring 54 and stud 72.

The invention is capable of wide variation within equivalent limits and I contemplate such variation as may be desirable or useful in the particular adaptation of the invention shown, or in its adaptation to other devices. I do not restrict myself in any unessential particulars, but what I claim and desire to secure by Letters Patent is:

1. In a transfer mechanism for counters, the combination of a shaft, a plurality of numeral wheels rotatably mounted thereon, a plurality of cams non-rotatably secured to said shaft, said cams cooperating with said numeral wheels, one cam for each wheel, a floating roller, retaining means on said numeral wheel for said roller, said roller being cooperable with said cam whereby the rise on said cam will place said roller into locking engagement with the adjacent numeral wheel upon effecting a transfer operation, and means to lock all of the numeral wheels except the units

numeral wheel against rotation during the intervals between transferring operations.

2. In a counter, the combination of a shaft, a plurality of numeral wheels rotatably mounted thereon, a plurality of cam members interposed between said numeral wheels and non-rotatably secured to said shaft, one of said cam members being associated with each of said numeral wheels, means for effecting a transfer between adjacent wheels, said means comprising an element revoluble about said shaft with one of said numeral wheels and adapted to be forced into locking engagement with an adjacent numeral wheel by contact with said cam member, a pin longitudinally slidable in each of said cam members, and depressions in the sides of said numeral wheels adapted to receive the ends of said pins, thereby to lock said numeral wheels relative to said cam members between transfer operations.

3. In a counter, the combination of a casing, a shaft normally stationary within said casing, a plurality of numeral wheels rotatably mounted on said shaft, each of said numeral wheels having a recessed right side, said recessed portion having a series of notches in its periphery, an annular flange protruding from the left side of each of said wheels and having an opening therein, a roller radially movable in each of said openings and cooperable with said notches, and a cam associated with each of said rollers and non-rotatably mounted on said shaft, said cam being adapted to force said roller into coupling engagement with one of said notches to effect a transferring operation.

4. In a counter, the combination of a casing, a shaft normally stationary within said casing,

a plurality of numeral wheels rotatably mounted on said shaft, each of said numeral wheels having a recessed right side, said recessed portion having a series of notches in its periphery, a cylindrical flange protruding from the left side of each of said wheels and having an opening therein, a roller radially movable in each of said openings and cooperable with said notches, and a cam associated with each of said rollers and non-rotatably mounted on said shaft, said cam being substantially cylindrical but having at one point an abrupt rise, a short path along the top of said rise and then a curved decline, said decline being on a radius the same as the aforementioned roller, and said cam being adapted to force said roller into coupling engagement with one of said notches to effect a transferring operation.

5. In a counter, the combination of a casing, a shaft normally stationary within said casing, a plurality of numeral wheels rotatably mounted on said shaft, each of said numeral wheels having a recessed right side, said recessed portion having a series of arcuate notches in its periphery, a cylindrical flange protruding from the left side of each of said wheels, and having an opening therein, each opening having one straight side and one arcuate side, a roller radially movable in each of said openings and cooperable with said notches, and a cam associated with each of said rollers and non-rotatably mounted on said shaft in such manner as to cooperate with the roller and the arcuate notches in the right side of the adjacent numeral wheel to provide a means for carrying over said numeral wheel in a transfer operation.

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