United States Patent [19]

Young

[11] **3,845,283**

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[54] **FOURTH WHEEL FOR THREE-WHEEL COUNTERS**

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[73] Assignee: **Sun Oil Company of Pennsylvania,** Philadelphia, Pa.

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[21] Appl. No.: **442,535**

[52] **U.S. Cl.** ..... **235/133 R,** 235/94 R, 235/117 R, 235/134, 235/144 ME, 235/144 R

[51] **Int. Cl.** **G06c 15/26,** G06c 15/42

[58] **Field of Search**...235/133, 142, 144 SP, 144 ME, 235/1 C, 117 R, 94 R

[56] **References Cited**

UNITED STATES PATENTS

3,309,018	3/1967	Wilson	235/144 D
3,720,370	3/1973	Young	235/94 R

FOREIGN PATENTS OR APPLICATIONS

658,405	1/1929	France	235/144 SP

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[57] **ABSTRACT**

For increasing the "sale" or "cost" registering capacity of a conventional three-wheel register (counter) used in gasoline dispensers, a fourth partial wheel is provided by means of a plate which can be inserted in the register and which is arranged to be driven (i.e., rotated) from the highest-order cost wheel of the register. The fourth-wheel mechanism is relatively simple and inexpensive, such that it can be readily added to operating registers in the field.

10 Claims, 6 Drawing Figures

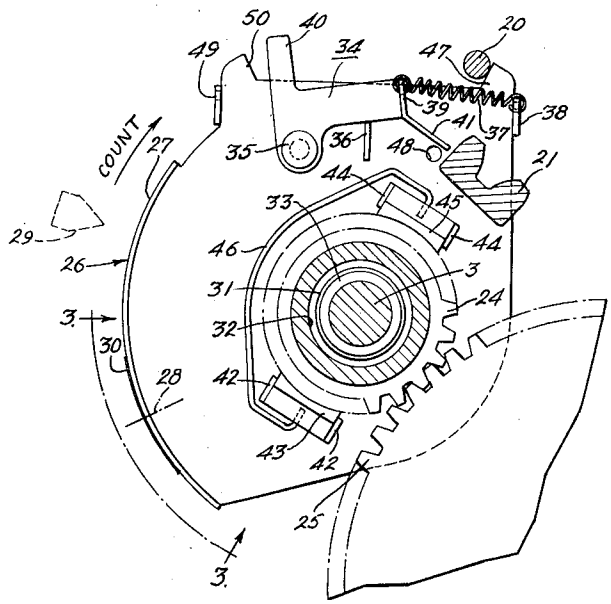


FIG. 1.

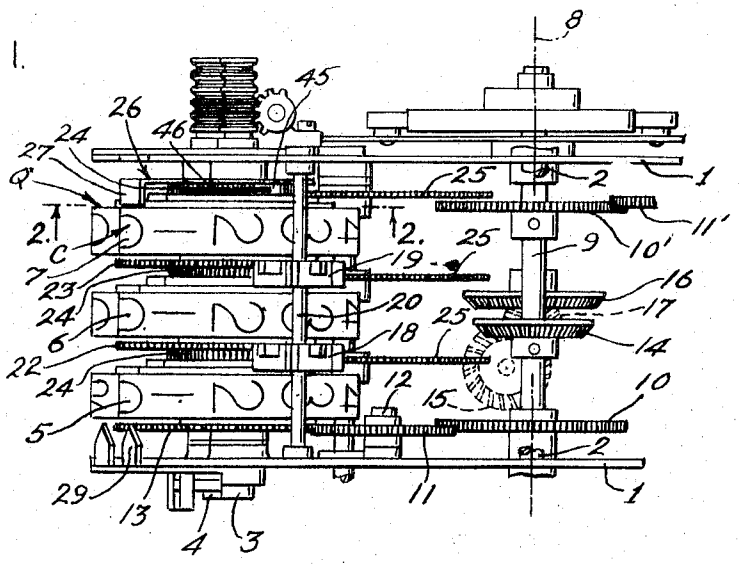


FIG. 2.

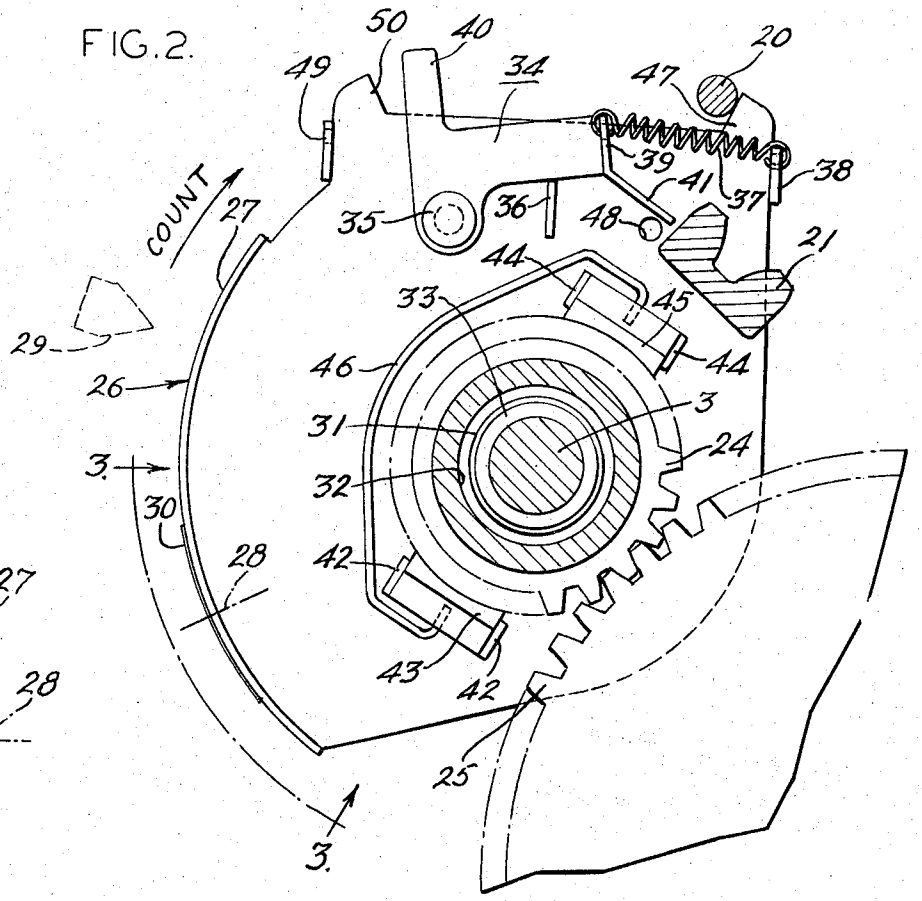


FIG. 3.

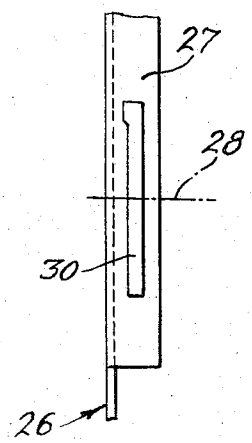


FIG. 4.

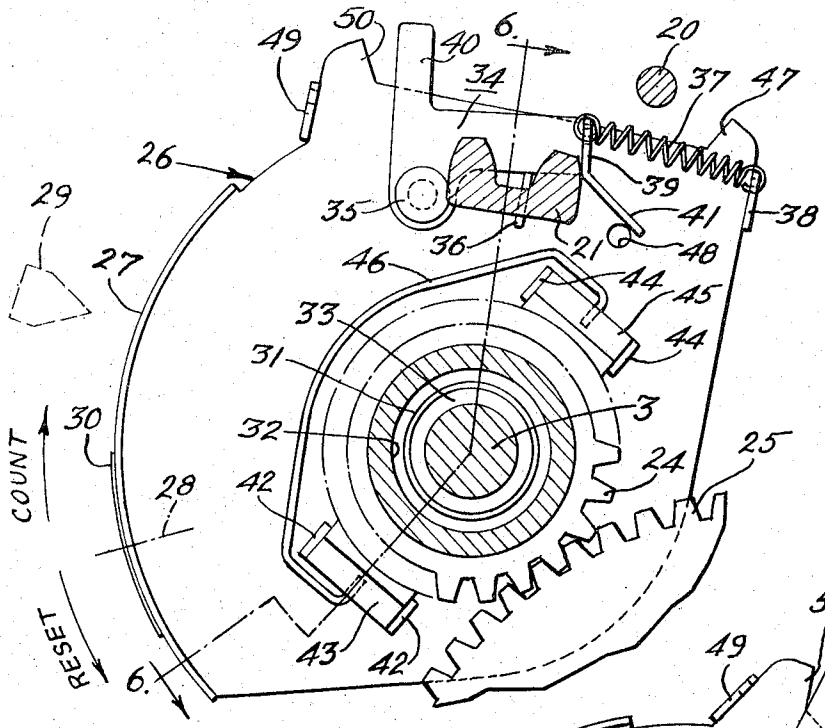


FIG. 5.

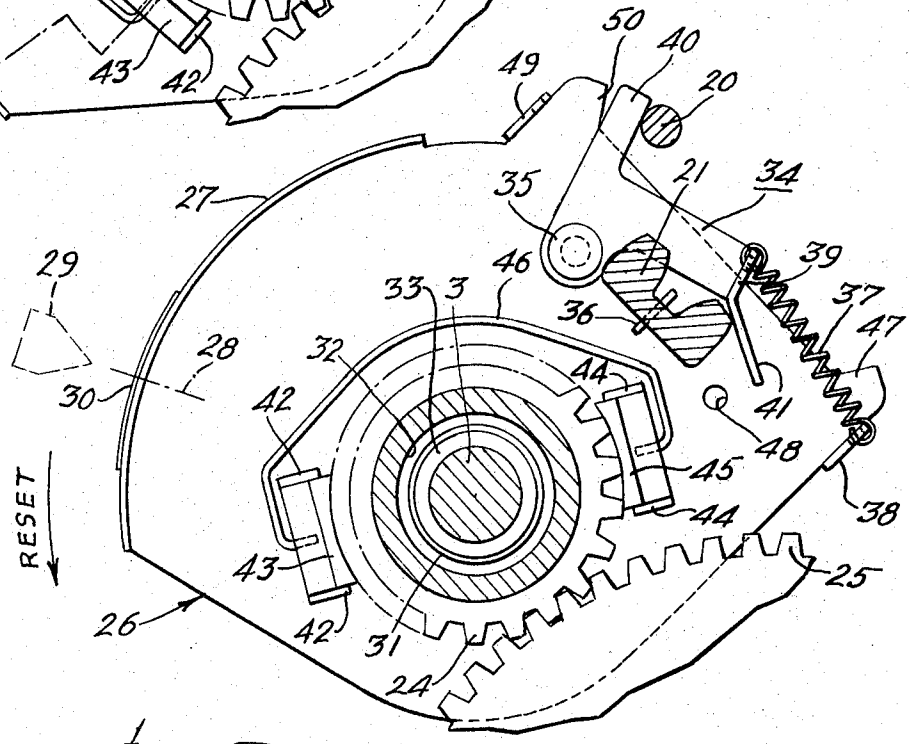
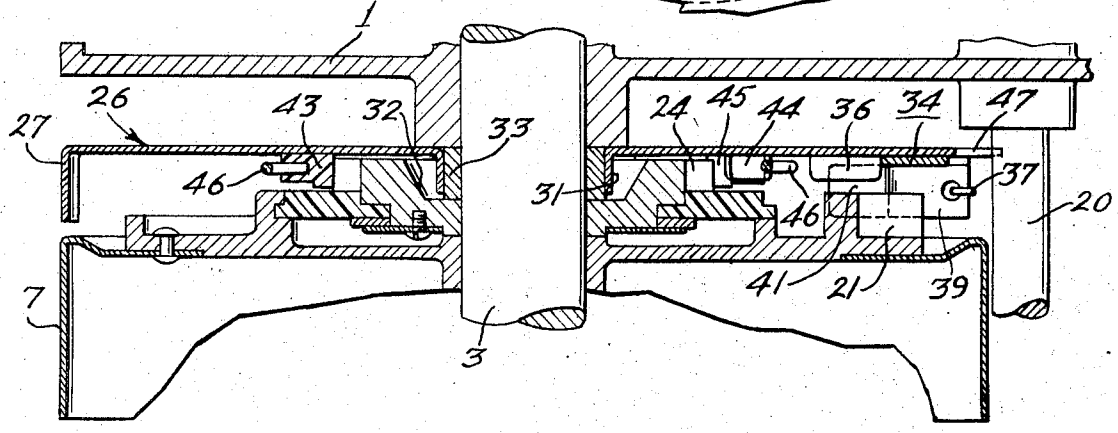


FIG. 6.



FOURTH WHEEL FOR THREE-WHEEL COUNTERS

This invention relates to mechanically driven counters, of the type illustrated, for example, in Bliss Pat. No. 2,814,444. Counters of this type are in common use at the present time in gasoline dispensers (gasoline dispensing apparatus). Most counters presently in use in gasoline dispensers have three wheels each for "sale" or "cost" and gallons, as disclosed in the aforementioned patent. Thus, the maximum "sale" capacity of these counters is 9.99 dollars, which is presently becoming inadequate.

Four-wheel counters (registers) could be purchased for replacement, but this would involve an extremely large monetary investment, considering the very large number of three-wheel counters presently in use.

Therefore, an object of the present invention is to provide a novel arrangement for increasing the capacity of a mechanically driven counter.

Another object is to provide a relatively simple and inexpensive fourth wheel arrangement for a three-wheel counter.

A further object is to provide a fourth wheel arrangement which can be readily added to presently existing counters, for modifying the same.

A detailed description of the invention follows, taken in conjunction with the accompanying drawings, wherein:

FIG. **1** is a partial or fragmentary plan view of a counter or register embodying this invention;

FIG. **2** is a cross-section taken along line **2—2** of FIG. **1**;

FIG. **3** is a side view of the fourth wheel of the invention, looking in the direction **3—3** of FIG. **2**;

FIGS. **4** and **5** are sectional views similar to FIG. **2**, illustrating two different positions of operation of the inventive device; and

FIG. **6** is a cross-section taken along line **6—6** of FIG. **4**.

Speaking generally, in counters of the type with which this invention is intended to be used, each higher order number wheel is driven a predetermined angular distance by the respectively preceding lower order number wheel each time the lower order number wheel makes one complete revolution. This transfer or carry-over from the lower order wheel is accomplished by means of a gear segment on the lower order number wheel which is engageable with a rotatable mutilated pinion (transfer pinion) having a full toothed portion engageable with a driven gear on the higher order wheel.

In a standard three-wheel counter, the gear segments (tooth segments) on the first and second wheels advance the respective next wheels one number for each complete revolution of the first and second wheels, in the manner described in the preceding paragraph. According to this invention, a fourth partial wheel is insertable into the three-wheel counter; this wheel will show a 1 when the counter turns over from 9.99 dollars, thereby allowing the counter to total up to 19.99 dollars.

Referring now more particularly to FIG. **1**, showing a counter of the type particularly adapted for use in gasoline-dispensing apparatus, it will be seen that the counter is mounted on a frame consisting of a pair of side plates **1** held in spaced-apart relationship by

spreader bars **2**. Two axially movable horizontal wheel-supporting shafts **3** and **4** are slidably journaled in the frame, the shaft **3** having mounted thereon a group of three rotatable number wheels **5, 6,** and **7,** arranged in decade relationship, for registering the cost of the gasoline dispensed, these wheels being sometimes hereinafter referred to as the cost wheels C. Similarly mounted on the shaft **4** is a group of three rotatable number wheels which are utilized to register the quantity of gasoline dispensed, which latter group of wheels is hereinafter referred to as the quantity wheels Q. In this type of apparatus, it is desired to provide a duplicate indication at opposite ends of the counter so that the operator (which would be the customer in a self-service operation) may read the indication from either side of the dispensing apparatus. Accordingly, a pair of shafts (not shown) are provided at the opposite end of the counter (i.e., on the opposite side of the center line **8** from the shafts **3** and **4**), on which are respectively mounted a group of three cost wheels duplicating the cost wheels C, and a group of three quantity wheels duplicating the quantity wheels Q.

The manner in which the cost wheel and the quantity wheels are driven in order to register the cost and quantity of the liquid dispensed will not be described. There is rotatably mounted midway between the ends of the frame an upper cross-shaft **9** and a lower cross-shaft, not specifically shown. The shaft **9** has fixed thereto adjacent the ends of the shaft a pair of gears **10, 10'** which mesh with idler gears **11, 11'** mounted on studs such as **12** which are respectively mounted in the opposite side plates **1**. The idler gear **11** (and, similarly, the idler gear **11'**) is in mesh with the driven gear **13** which is connected to the wheel **5** of lowest order of the cost wheels C. The shaft **9** has fixed thereto, intermediate its ends, a bevel gear **14** which meshes with a bevel gear **15** shown in phantom in FIG. **1**. This latter gear is mounted on the output shaft of a variator which, as disclosed in the above-mentioned patent, is set in accordance with the price per gallon of the liquid being dispensed to produce the proper speed ratio between the drives to the cost wheels and quantity wheels, respectively. Thus, the arrangement is such that the unit wheel of the group of cost wheels C (and also the unit wheel of the group of oppositely disposed cost wheels) will be driven at a speed commensurate with the price of the quantity of gasoline being dispensed.

For driving the quantity wheels Q, the lower cross-shaft previously referred to is rotated by means of a bevel gear **16** fixed intermediate the ends of this latter shaft and meshing with a bevel gear **17** shown in phantom in FIG. **1**; gear **17** is mounted on a shaft driven without any variable speed change by a meter through which is passed the gasoline dispensed and which is rotated thereby in an amount commensurate with the quantity of gasoline dispensed. The meter is used to drive the quantity wheels Q directly, while the drive to the cost wheels C is through the variator which changes the speed of rotation in accordance with the price per gallon of the liquid dispensed. For transferring the drive from the lower cross-shaft to the number wheel of lowest order of the quantity wheels Q (and also to the number wheel of lowest order of the group of oppositely disposed quantity wheels), a gear arrangement similar to the arrangement **10, 11, 13** previously described for the cost wheels (and disclosed in detail in the aforementioned patent) is utilized.

Each of the number wheels **5, 6,** and **7** of the group of cost wheels C (and, also, each of the number wheels of the oppositely disposed group of cost wheels) is provided about its periphery with indicia consisting of the numerals 0 to 9 inclusive, and it is the intention that for each complete revolution of a number wheel of lower order, the wheel of next higher order will be rotated one-tenth revolution. The transfer mechanism for transferring the count from the wheels of lower order to the wheels of higher order is quite conventional and includes the use of transfer pinions **18** and **19** rotatably mounted on a transverse shaft **20.** The cost wheels **5–7** are all identical, and each carries a two-toothed driving gear such as the driving gear **21** (carried by wheel **7**) shown in FIG. **2.** The transfer mechanisms for transferring the count from wheel **5** to wheel **6,** and from wheel **6** to wheel **7,** operate, in general, in the following manner. Upon each rotation of the wheel of lower order, the transfer pinion is engaged by the two-tooth driving gear on the wheel of lower order, which operates to impart a partial rotation to the transfer pinion. The transfer pinion also meshes with the driven gear of the number wheel of next higher order, thus advancing the number wheel of higher order one-tenth revolution each time the transfer pinion is actuated. Thus, upon each rotation of wheel **5,** transfer pinion **18** is engaged by the two-toothed driving gear (similar to gear **21** illustrated) on wheel **5,** imparting a partial rotation to transfer pinion **18**; transfer pinion **18** meshes with the driven gear **22** of number wheel **6,** advancing this latter wheel one-tenth revolution each time transfer pinion **18** is actuated. Likewise, upon each rotation of wheel **6,** transfer pinion **19** is engaged by the two-toothed driving gear (similar to gear **21** illustrated) on wheel **6,** imparting a partial rotation to transfer pinion **19**; transfer pinion **19** meshes with the driven gear **23** of number wheel **7,** advancing this latter wheel one-tenth revolution each time transfer pinion **19** is actuated. This type of transfer mechanism is somewhat more fully disclosed in the aforementioned patent, and also in Bliss et al., Pat. No. 2,928,288.

The means to transfer the count of the wheels of lower order to the wheels of higher order in the group of quantity wheels Q (and also in the oppositely disposed group of quantity wheels) is the same as in the case of the cost wheels, previously described.

For resetting the counter, a set of ultimate resetting gears **24** is provided, one for each number wheel (such as **5–7**) of the counter. Each of the gears **24** meshes with a respective resetting gear **25,** each resetting gear **25** driving its respective ultimate gear **24,** which rotates the number wheels (such as **5–7**) in the opposite direction (i.e., in a direction opposite to that in which these wheels rotate when counting) when resetting. A clutch between each resetting gear **24** and its respective number wheel (such as **5–7**) allows the wheels to count while the gears **24** are stationary. A typical resetting mechanism, as well as the clutches previously referred to, is disclosed in detail in the '444 patent first mentioned. Other resetting mechanisms which can be used are disclosed in my prior Pat. Nos. 3,616,996 and 3,720,370.

Referring now more particularly to FIGS. **2–6,** in accordance with the invention a fourth "wheel" for the counter comprises a plate, denoted generally by numeral **26,** which has at its outer edge a flange **27** (in the form of an arcuate segment) extending at right angles to the plate, the flange being for example 9/32-inch wide. The plate carries as indicia the numeral 1, centered on the center line **28** of FIG. **2** (see also FIG. **3**). Although this numeral is illustrated in FIG. **2** as being raised or embossed as at **30** on the surface of the flange **27,** this is only for convenience in illustration; actually, this numeral is depressed or pressed into the outer surface of the flange, just as are the numerical indicia on wheels **5–7.** The 0 position of the plate **26,** shown in FIG. **2** aligned with the reference index **29** (which corresponds to the actual fixed index **29** in FIG. **1**), is blank.

Plate **26** is formed from **22**-gauge material (30 mils thick), allowing it to be inserted to the left ("left" here referring to the normal viewing of the counter when it is mounted in a dispensing apparatus; this corresponds to "above" in FIGS. **1** and **6**) of the third or highest-order cost wheel **7.** As may be seen in FIG. **6,** plate **26** is rotatably mounted on shaft **3,** adjacent the third or highest-order cost wheel **7,** by means of an integral hub **31** which extends into the concentric frusto-conical depression **32** in resetting gear **24** (which latter, as previously mentioned, is coupled through a clutch, not shown, to number wheel **7**). A bushing-spacer **33** is inserted between hub **31** and the shaft **3.** Plate **26** is thus mounted for free rotation on shaft **3.**

A pawl **34** is pivotally mounted, by means of a pivot pin **35,** on the side of plate **26** facing the wheel **7.** In the reset position, illustrated in FIG. **2,** pawl **34** is urged against a stop **36** (comprising an integral tab bent up from plate **26**) by means of a coiled tension spring **37**; one end of spring **37** is attached to an ear **38** bent up from plate **26,** and the other end of this spring is attached to an integral flange **39** on the pawl **34.** In this position, the pawl flange **39** can be engaged by the two-toothed driving gear **21** on wheel **7,** as the latter rotates in the "count" or clockwise direction from the position illustrated in FIG. **2** to the position illustrated in FIG. **4.**

FIG. **4** illustrates the position of the parts in the 9 position of the third cost wheel **7** of the counter. As the number 9 appears on the third wheel **7,** the side of the gear segment **21** on this wheel touches the pawl flange **39,** as shown in FIG. **4.** As the third wheel **7** rotates to the 0 position (which latter position is illustrated in FIG. **5**), gear segment **21** pulls the pawl **34,** and therefore the plate **26,** clockwise.

Clockwise rotation of plate **26** brings the numeral 1 on flange **27** into alignment or registry with index **29,** as illustrated in FIG. **5** (center line **28** in alignment with index **29**).

Near the 0 position of wheel **7,** the outwardly extending tab **40** of pawl **34** touches the transfer pinion shaft **20** (see FIG. **5**), thereby rotating the pawl counterclockwise (away from stop **36**), against the return force of spring **37,** until the pawl **34** is disengaged from the gear segment **21** (as shown in FIG. **5,** wherein the gear segment can slide past the tail portion **41** of pawl flange **39**).

The wheel **7** continues to rotate a slight amount, to its 0 position. At this point in time, the counter will read 10.00 dollars. (As previously stated, this is the position illustrated in FIG. **5.**)

A pair of integral tabs **42,** parallel to each other and spaced about ½ inch apart, are bent up from plate **26,** and between these tabs, so as to be guided thereby, is mounted a brake shoe **43** made, for example, from the

synthetic material known as "Delrin," and adapted to bear against the resetting gear **24** on wheel **7**. Diametrically opposite tabs **42**, there is another pair of integral tabs **44**, parallel to each other and spaced about ½ inch apart, which are bent up from plate **26**. Between tabs **44**, so as to be guided thereby, is mounted a brake shoe **45** which is an exact duplicate of shoe **43** and is also adapted to bear against the resetting gear **24**. The shoes **43** and **45** are urged inwardly, against gear **24**, by a curved spring **46**, made from music wire for example, whose two opposite ends engage the shoes **43** and **45**, respectively.

Since the gear **24** remains stationary during the counting cycle, and since shoes **43** and **45** are mounted on plate **26** and hence rotate therewith, the previously described clockwise rotation of plate **26** during the counting cycle must overcome the friction offered by the brakes **43** and **45** on the gear **24**. Once the above-described rotation of plate **26** (during the counting cycle) has occurred, the brake friction will prevent plate **26** from falling backward upon disengagement of the pawl **34** from gear segment **21**. This disengagement allows number wheel **7** to rotate, in steps, all the way to the next 9.

During the reset cycle, gear **25** rotates gear **24** in the "reset" or counterclockwise direction slightly more than one turn, as fully described in my two aforementioned patents and also in the '444 patent. As gear **24** rotates counterclockwise, the brake friction causes plate **26** to rotate counterclockwise also, until the integral outwardly extending stop tab **47** on plate **26** strikes shaft **20** (see FIG. 2), stopping the plate in the 0 position. The gear **24** continues to rotate, the brake shoes **43** and **45** slipping on this gear, to reset the number wheel **7** (similar gears **24** resetting the number wheels **5** and **6**, as previously described). It may be noted, at this point, that shaft **20** is always stationary, so contact with it introduces no friction.

Pawl **40** has a long flange portion **39, 41**, so that on resetting it is impossible for it to fall between the two teeth in segment **21** and get hung up.

The preceding description has shown and explained the "rear" third and fourth wheels. The "front" wheels, on the other side of the counter, count and reset in the opposite direction.

The assembly on the other side of the counter (for the oppositely disposed group of cost wheels, previously mentioned) would be similar to that above described, except that a pawl of the opposite hand (as compared to pawl **34**, described) would be pivotally mounted in the other hole **48** of plate **26**, and a spring similar to **37** would go to the ear **49** on plate **26** that is opposite to ear **38**, and is adjacent to the other stop tab **50** formed on plate **26**.

To install the "fourth wheel" (plate **26**) of this invention, shaft **3** is removed, using tools devised for normal maintenance, and the group of three wheels **5, 6,** and **7** is dropped out. Plate **26**, with its attached pawl **34** and its brake shoes **43** and **45**, is assembled to the left end of the wheel group (the term "left" here having the same significance as before, plate **26** being assembled to the side of the third wheel **7** opposite to the second wheel **6**) so that the brake shoes ride on the outside of gear **24**. The group of wheels is then reassembled into the counter.

The invention claimed is:

1. For a counter with an array of identical ordered number wheels each having a driving gear segment adapted to be used in transferring a count from a number wheel of lower order to the number wheel of next higher order: an arrangement for increasing the maximum count-indicating capability of said counter beyond that provided by said array, comprising a plate mounted for rotation adjacent the number wheel of highest order in said array, said plate bearing numerical indicia; and a pawl pivotally attached to said plate and having a portion engageable by the driving gear segment on said highest order wheel to cause rotation of said plate through a predetermined angle.

2. Arrangement recited in claim **1**, including also means carried by said pawl for causing disengagement of said pawl from the driving gear segment on said highest order wheel upon rotation of said plate through said angle.

3. Arrangement of claim **2**, wherein said means comprises an integral tab on said pawl which engages a fixed abutment to pivot said pawl relative to said plate and also relative to the driving gear segment on said highest order wheel.

4. Structure recited in claim **1**, including also a resetting gear releasably coupled to said highest order number wheel and driven to cause resetting of said last-mentioned number wheel, and yieldable friction means coupling said plate to said gear.

5. Structure of claim **4**, wherein said friction means comprises a pair of friction blocks mounted on said plate and engaging the teeth of said gear.

6. Arrangement recited in claim **1**, including also means normally biasing said pawl to a position such as to be engaged by the driving gear segment on said highest order wheel.

7. Arrangement defined in claim **6**, including also means carried by said pawl for causing disengagement of said pawl from the driving gear segment on said highest order wheel upon rotation of said plate through said angle.

8. Arrangement of claim **7**, wherein the means for causing disengagement comprises an integral tab on said pawl which engages a fixed abutment to pivot said pawl relative to said plate and also relative to the driving gear segment on said highest order wheel.

9. Structure of claim **8**, wherein the mechanism for transferring a count from a number wheel of lower order to the number wheel of next higher order includes a transfer pinion mounted rotatably on a shaft and driven by the corresponding driving gear segment; and wherein said fixed abutment comprises said shaft.

10. Structure recited in claim **1**, including also a resetting gear releasably coupled to said highest order number wheel and driven to cause resetting of said last-mentioned number wheel, yieldable friction means coupling said plate to said gear, and means normally biasing said pawl to a position such as to be engaged by the driving gear segment on said highest order wheel.

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