United States Patent [19]

Young

[11] **3,916,713**

[45] **Nov. 4, 1975**

[54] **SNAP ACTION TRANSFER PINION**

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

[22] Filed: **Jan. 22, 1975**

[21] Appl. No.: **542,972**

[52] **U.S. Cl.** **74/411;** 74/440

[51] **Int. Cl.²** **F16H 57/00;** F16H 55/18

[58] **Field of Search** 74/411, 434, 440

[56] **References Cited**

UNITED STATES PATENTS

2,336,307	12/1943	Slye	64/27
2,928,288	3/1960	Bliss et al.	74/411

Primary Examiner—Leonard H. Gerin

Attorney, Agent, or Firm—George L. Church; Donald R. Johnson; William C. Roch

[57] **ABSTRACT**

A transfer pinion having several interlocking parts has been designed to replace the conventional one piece transfer pinion used on conventional multi-wheel counters. The advantage gained from using this invention is a more accurate reading on the counter because the higher ordered counting wheel will not rotate until the lower ordered counting wheel has made essentially one complete revolution. This advantage is especially important when using a counter which has a "100 cent" wheel for its lowest ordered counting wheel.

12 Claims, 6 Drawing Figures

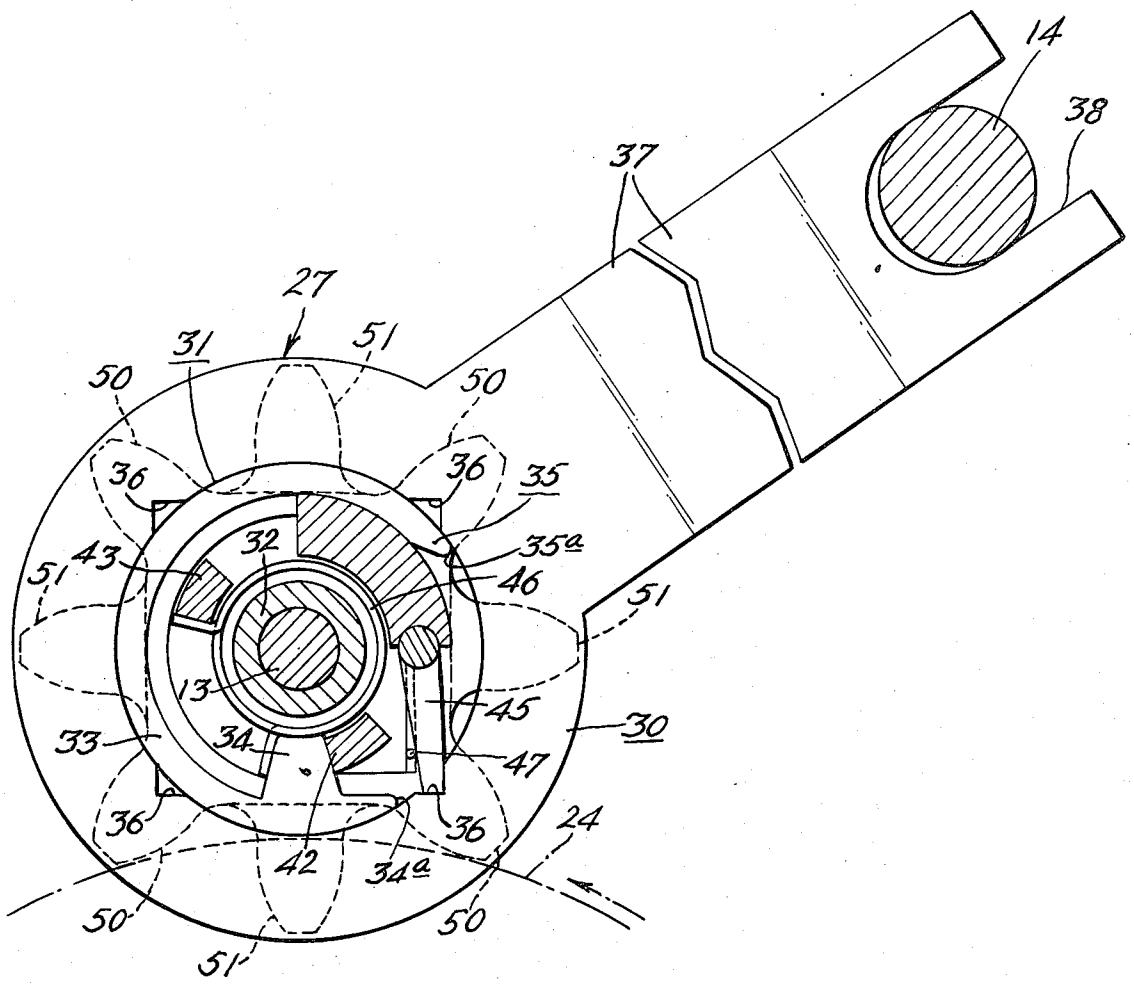


FIG. 1.

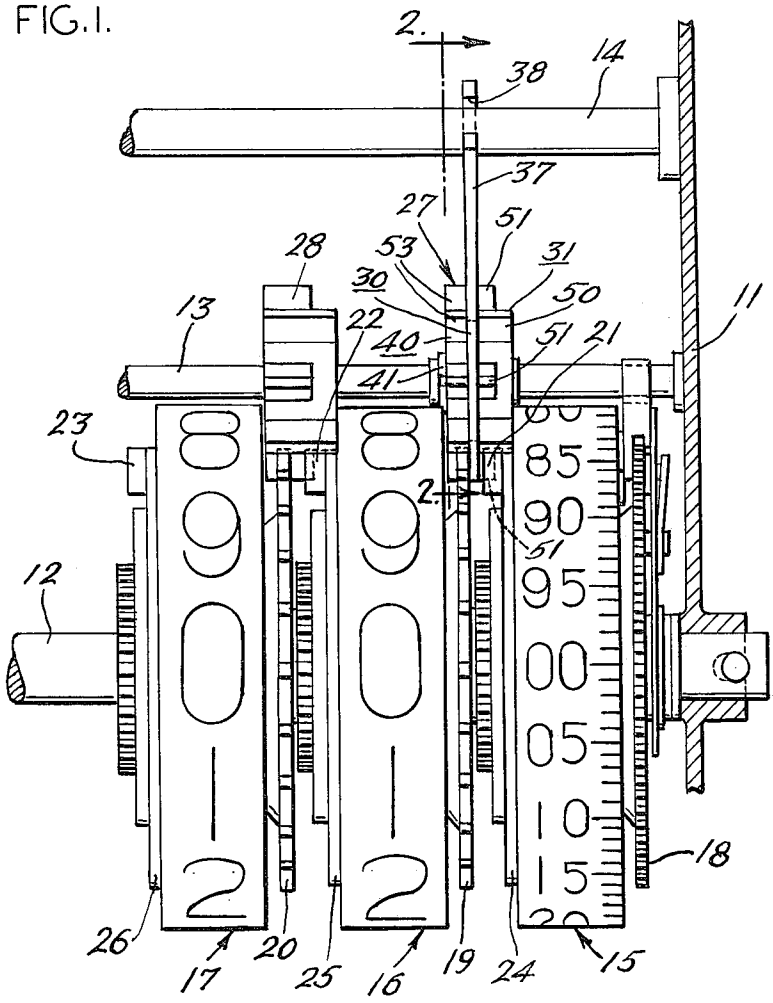


FIG. 2.

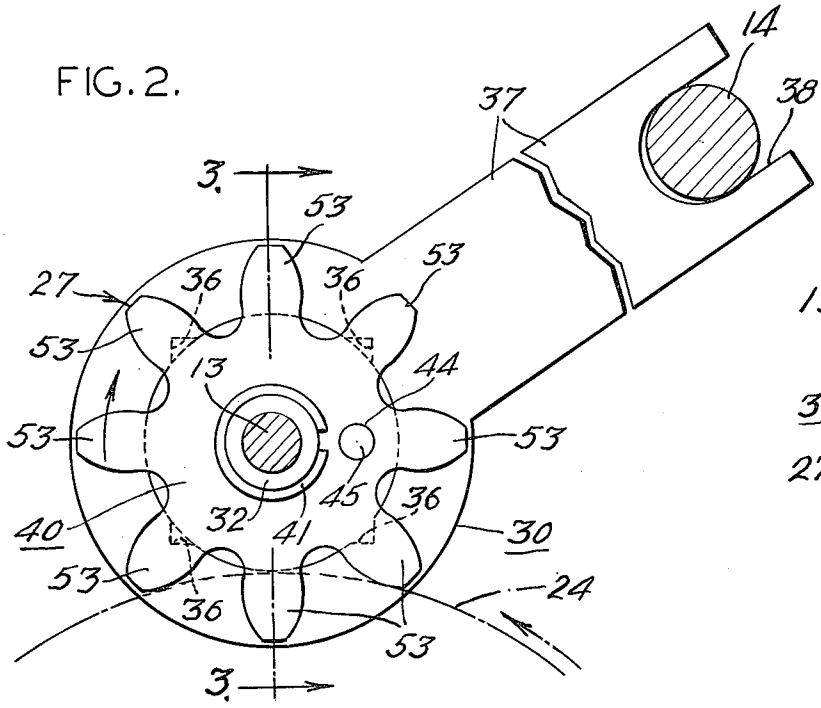


FIG. 3.

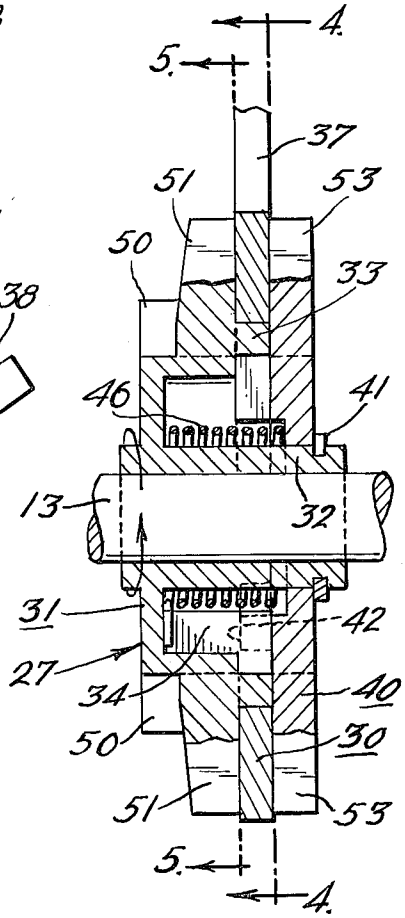


FIG. 4.

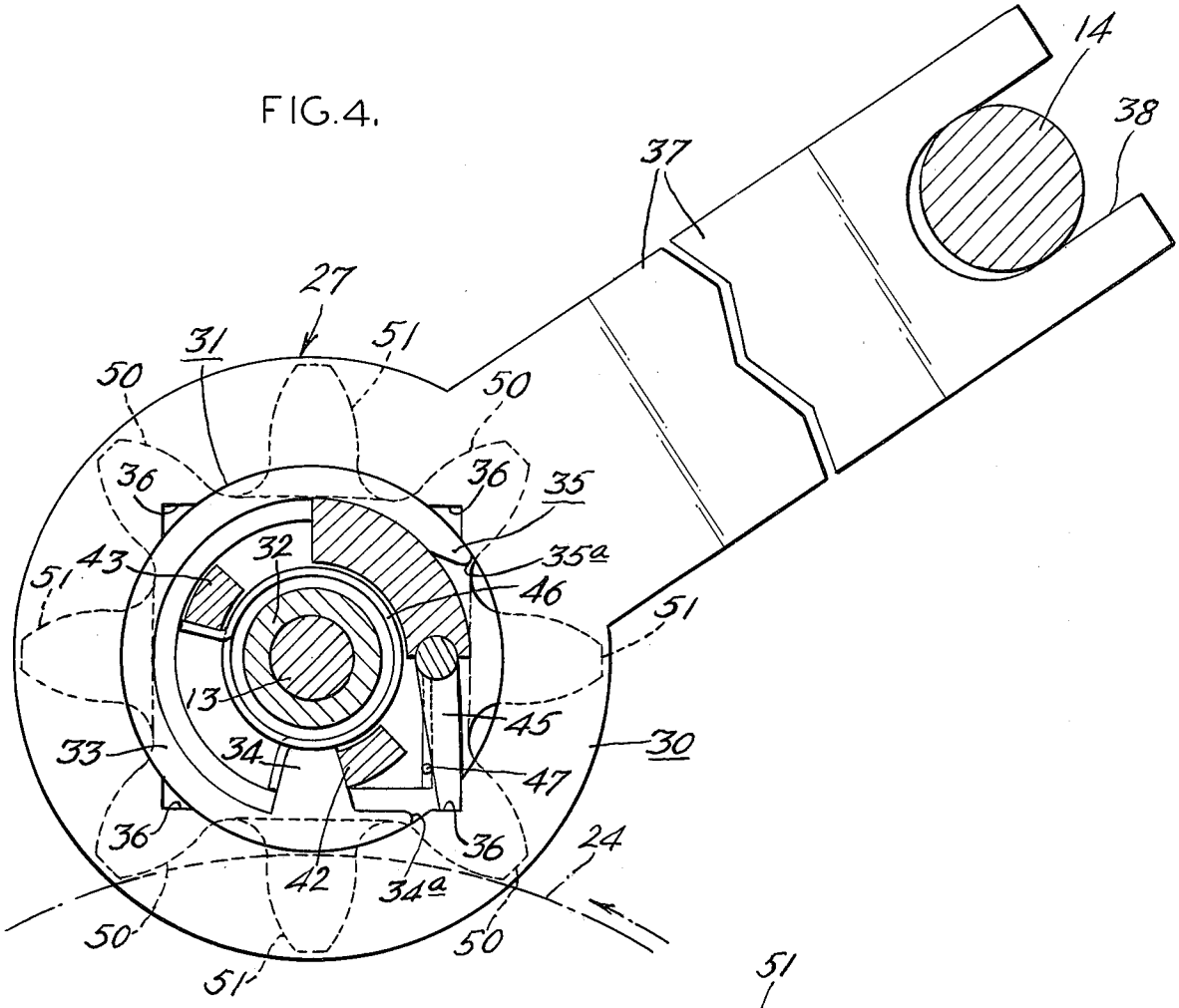

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37
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35a
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34a
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FIG. 5.

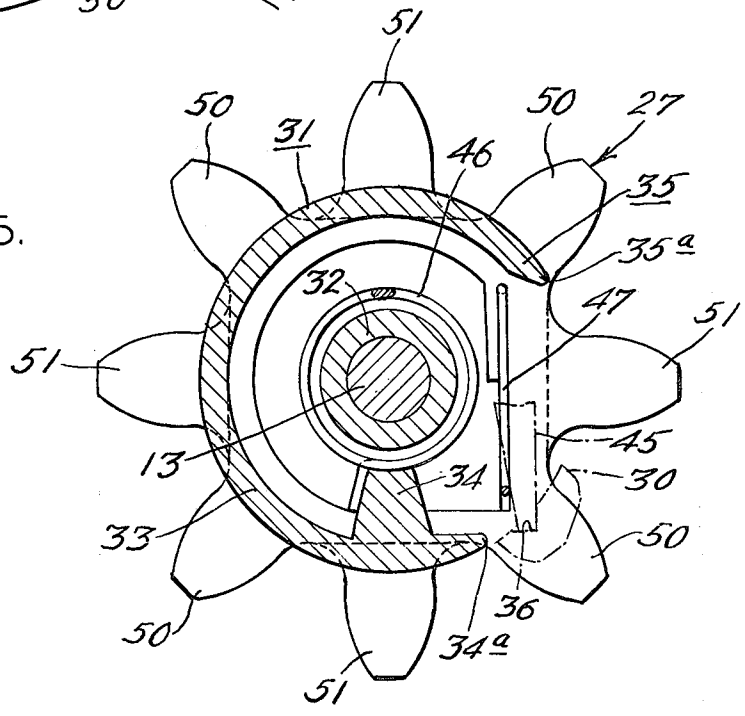
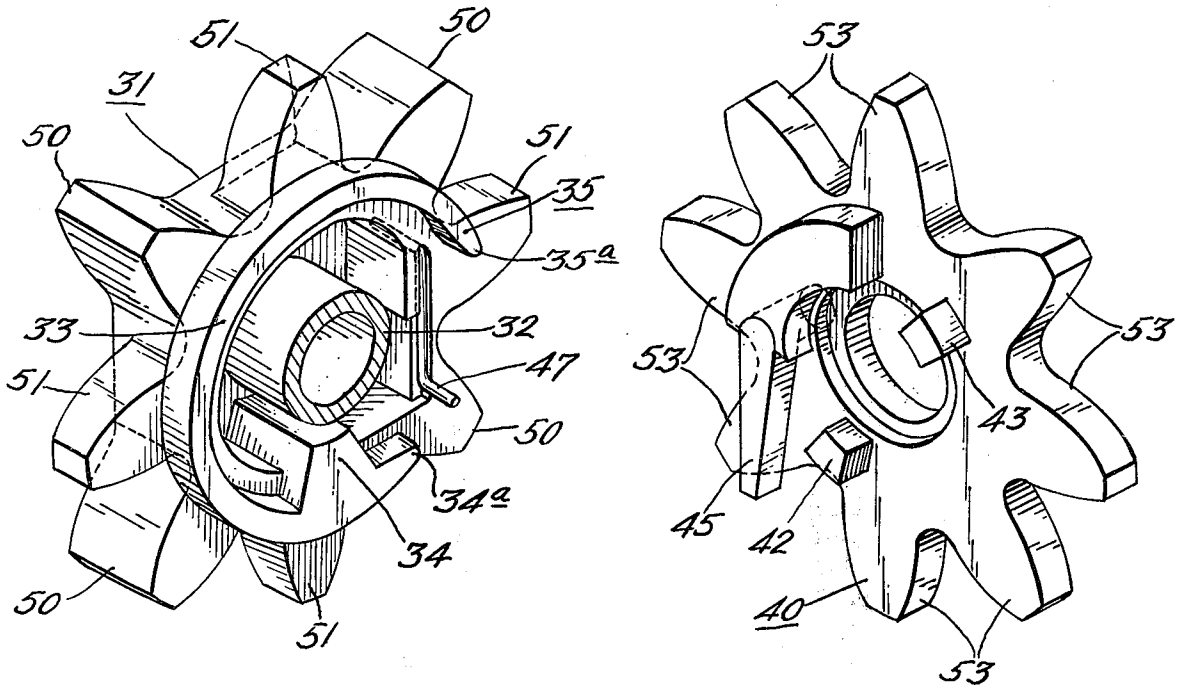

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FIG. 6.


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SNAP ACTION TRANSFER PINION

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to a transfer pinion used in the transfer gearing mechanism between different ordered counting wheels in a mechanically-driven counter, of the type illustrated, for example, in Bliss U.S. Pat. No. 2,814,444 or in the Young patent application entitled "Register Price Wheel Structure", Ser. No. 489,275. More particularly, this invention discloses a novel and improved transfer pinion which prevents rotation of the next higher ordered counting wheel until the lower ordered counting wheel has almost completely rotated around to zero again.

2. Description of the Prior Art

The conventional three wheel counter now being used can produce an inaccurate reading when the higher ordered wheel is rotated to the next number on its dial before the lower ordered wheel completely returns to zero. This problem is magnified when the lowest ordered wheel is a 100 cent wheel as described in the Young application. Without the snap action transfer pinion disclosed herein, the counter reading appears to be one dollar more than it should when the 100 cent wheel registers between 90 cents and 00 cents. The prior art fails to provide a solution to this problem.

Several patents disclose gear designs having two gear sections with resilient means connected between the sections. Wood, U.S. Pat. No. 978,977, uses two sections in his gear design, one section attached to a shaft and the other section comprising the gear teeth. These two sections are resiliently opposed by coil springs. Bailey, U.S. Pat. No. 1,608,050, also uses a gear having two sections which are resiliently opposed by coil springs. However, the gear sections are lateral sections, each having matching gear teeth. Slye, U.S. Pat. No. 2,336,307, discloses the use of resilient means in the counting wheels in a multi-wheel counter. Bliss, U.S. Pat. No. 2,928,288, discloses use of resilient means in the transfer pinion used in a multi-wheel counter. While all of these patents disclose the storing of energy in a resilient means for the prevention of shocks, none of these inventions discloses the storage of energy in the spring and its release when one section of the gear has rotated a predetermined distance.

The Haydon Instrument Company, 165 West Liberty Street, Waterbury, Conn., has manufactured a multi-wheel counter which rotates the next higher ordered counting wheel by storing energy in a spring and releasing it. However, no transfer pinion is used and the energy stored is released during the last 10 percent of the full revolution of the lower ordered counting wheel. This system will not provide the accuracy needed for counters with 100 cents counting wheels and cannot be easily adapted to existing counters. This information is contained in a Haydon Instrument Company advertising publication on their Model 2000 counter, dated Feb. 20, 1959. Consequently, the prior art is not capable of providing the results obtained by the invention herein disclosed.

Accordingly, it is an object of this invention to provide a novel transfer pinion for use with a conventional multi-wheel counter, having means to prevent rotation of a higher ordered counting wheel until the lower ordered counting whell has completely rotated around to zero again.

It is another object of this invention to provide a transfer pinion of the type described that can be easily and inexpensively installed in multi-wheel counters presently in operation.

It is further the object of this invention to provide a design for an improved transfer pinion which will be small and yet durable and able to withstand continuous use.

SUMMARY OF THE INVENTION

The objects of this invention are accomplished, briefly, in the following manner:

A transfer pinion having a pinion body and a pinion cap are mounted coaxially against either side of a stationary detent plate. The internal design of each section interacts with the other sections in such a manner that the driven pinion cap will not turn until the driving pinion body has rotated through a predetermined arc.

Further objects and advantages of this invention will become obvious in the following detailed description of the invention.

DESCRIPTION OF THE DRAWINGS AND THE PREFERRED EMBODIMENT

FIG. 1 is a fragmentary elevational view showing the preferred manner of installation of a snap action transfer pinion constructed in accordance with this invention, when used in a conventional three wheel counter having a "100-cent"wheel.

FIG. 2 is an enlarged fragmentary section view from the line 2—2 in FIG. 1.

FIG. 3 is an enlarged vertical section taken on the line 3—3 in FIG. 2.

FIG. 4 is a transverse section taken on the line 4—4 in FIG. 3.

FIG. 5 is a transverse section taken on the line 5—5 in FIG. 3.

FIG. 6 is a perspective view showing the body and cap sections of the snap action transfer pinion in detached relationship and arranged to illustrate more clearly their confronting faces.

Referring first to FIG. 1, support frame 11 is designed to securely hold supporting shaft 12, pinion shaft 13, and stationary shaft 14. Counting wheels 15, 16 and 17 are mounted coaxially on supporting shaft 12, in a rotatable manner. Counting gears 18, 19 and 20 are secured to the right sides of counting wheels 15, 16 and 17, respectively, by suitable means. Two-toothed driving gears 21, 22 and 23 and slide ring 24, 25 and 26 are suitably secured to the left sides of counting wheels 15, 16 and 17, respectively. Transfer pinions 27 and 28 are mounted coaxially on pinion shaft 13, in a rotatable manner. Stationary shaft 14 passes through the detent plate 30 of transfer pinion 27.

In the disclosed embodiment, only transfer pinion 27 is the snap action type which comprises this invention. Transfer pinion 28 is the conventional one piece pinion, however, it is understood that it is possible to use snap action transfer pinions in place of all conventional pinions.

Now refer to the remaining figures for a better understanding of the parts of the snap action transfer pinion itself. Pinion body 31 is rotatably mounted on pinion shaft 13. Pinion body 31 has an inner hub 32 upon which it rotates around pinion shaft 13 and an outer rim 33 upon which detent plate 30 is rotatably mounted. Outer rim 33 interrupted at points 34*a* and 35*a*. An inwardly projecting stop 34 is formed at point

34*a* and point 35*a* forms an arm 35.

As stated above, detent plate 30 is rotatably mounted on outer rim 33 of pinion body 31. Detent plate 30 has four notches 36 equally spaced around its inside circumference. Detent plate 30 has an armed extension 37 with a bifurcated end 38 which engages stationary shaft 14, thereby preventing detent plate 30 from rotating.

Transfer pinion cap 40 serves as the second half of the transfer pinion and cooperates with transfer pinion body 31. Pinion cap 40 is rotatably mounted around inner hub 32 of pinion body 31 and locked into place by retaining ring 41. Molded to the inside face of pinion cap 40 are stop tab 42 and spring tab 43. Pinion cap 40 also has a bore 44 in which L-shaped pawl 45 rests. When assembled, coiled spring 46 is wound around inner hub 32 of pinion body 31, with one end lodged against stop 34 of pinion body 31 and the other end lodged against spring tab 43 of pinion cap 40 by the force of spring 46 itself. "Z" shaped protection member 47 rests in a groove formed on the inside surface of pinion body 31 with one end embedded in pinion body 31 (see FIG. 6), allowing the free end of member 47 to protrude transversely into the same plane of detent plate 30 and to remain near pawl 45.

For conventional operation, a counter mechanism is designed so that the pinion wheel rotates the higher ordered counting wheel one-tenth of a revolution for each one-fourth of a revolution the pinion itself is rotated. Also, the gears on pinion body 31, which is mounted next to the lower ordered wheel, preferably have a mutilated gear arrangement with alternately wide 50 and narrow teeth 51. In this manner, the wide teeth 50 rest on slide ring 24, thereby preventing rotation until two-tooth driving gear 21 engages a narrow tooth, causing pinion body 31 to rotate one-fourth of a revolution.

Once the counter begins operation, a means (not shown) drives counting gear 18 which is attached to the lowest ordered counting wheel 15. Driving gear 21 begins to engage gear teeth 50 and 51 of pinion body 31, when counting wheel 15 has rotated approximately to the 90 cent mark. At this time, coiled spring 46 has been exerting a force in the clockwise direction on pinion cap 40 forcing said body to rotate to the point where stop tab 42 of pinion cap 40 rests against stop 34 of pinion body 31 as shown in FIG. 4. Once driving gear 21 engages and rotates gear teeth 50 and 51 of pinion body 31, stop 34 rotates in the clockwise direction and coiled spring 46 causes pinion cap 40 to rotate until pawl 45 engages a notch 36 in detent plate 30. However, driving gear 21 continues to rotate pinion body 31, thereby increasing the tension in coiled spring 46. When counting wheel 15 reaches approximately 99 cents, arm 35 of pinion body 31 contacts pawl 45, pushing pawl 45 out of notch 36 of detent plate 30, thereby allowing the energy built up in coiled spring 46 to push pinion cap 40 clockwise until stop tab 42 contacts stop 34 again. The rotation of pinion cap 40 is transmitted through gear teeth 53 to counting gear 19 of the next higher ordered counting wheel 16.

"Z" shaped member 47 works in conjunction with pawl 45 to improve the reliability of the transfer pinion operation. Member 47 helps assure that pawl 45 engages a notch 36. When pinion cap 40 rotates, the end of pawl 45 slides along the inside face of detent plate 30 until it nears a notch 36. At this point, the pressure exerted on pawl 45 by member 47, causes the end of pawl 45 to engage into notch 36.

Occasionally, when the counter is reset, the transfer pinion may be rotated in reverse, which could damage the internal structure of the transfer pinion. To avoid this possibility, "Z" shaped member 47 is mounted in a groove formed in the inside face of pinion body 31. This groove has one side partially open so that "Z" shaped member 47 can be deflected partially out of the groove if pawl 45 is urged out of notch 36 by the reverse rotation of the transfer pinion.

While the above description is applicable to a snap action transfer pinion for use on the rear side of a multi-wheel counter in gasoline dispensing devices, it is noted that by complete reversal of the design for each part of the snap action transfer pinion, the relative rotation directions can be reversed for use of the pinion on the front set of counting wheels.

From the above disclosure it can be seen that there has been provided a transfer pinion for a multi-wheel counter having a design that enables the transmission of the rotation motion from the lower ordered counting wheel to the higher ordered counting wheel to be delayed until the lower ordered counting wheel has rotated essentially around to its zero position again.

While a particular embodiment of this invention has been shown and described, it is obvious that changes and modifications can be made without departing from the true spirit and scope of the invention. It is the intention of the appended claims to cover all such changes and modifications.

The invention claimed is:

1. In a gear having at least two lateral sections, each section having gear teeth around its circumference, an improvement which delays the rotation of the driven section until the driving section has rotated a predetermined amount comprising:
   a. means for storing energy from the rotational motion of the driving section,
   b. means for preventing the driven section from rotating, and
   c. means to release the stored energy when the driving section has rotated a predetermined distance, thereby causing the driven section to rotate.

2. Aparatus recited in claim 1 wherein resilient means is used for storing the energy from the rotational motion.

3. Apparatus recited in claim 2 wherein the resilient means comprises a coil spring.

4. Apparatus recited in claim 3 wherein the coil spring is mounted coaxially with the two gear sections and has one end secured to one lateral section and the other end secured to the other lateral section.

5. Apparatus recited in claim 1 wherein said preventing means and release means comprise:
   a. a stationary plate having an opening with notches around the opening, coaxially mounted between the two lateral sections,
   b. a pawl, rotatably mounted on the driven lateral section so that it can lodge into a notch on the stationary plate, and
   c. an arm mounted on the inside of the driving lateral section so that it will disengage the pawl from the notch when the driving lateral section has rotated a predetermined distance.

6. In a counter having a plurality of counting wheels arranged in ascending order, an improvement which delays the rotation of the higher ordered counting

wheel until the next lower ordered wheel has completed essentially one revolution, comprising:

means for storing energy from the rotational force that the lower ordered counting wheel exerts on the next higher ordered counting wheel when rotating the next higher ordered counting wheel a predetermined distance for each revolution the lower ordered counting wheel makes, and for releasing the stored rotational force when the lower ordered counting wheel essentially completes a revolution, thereby causing the next higher ordered counting wheel to rotate the predetermined distance.

7. Apparatus claimed in claim **6,** wherein the said means comprises:

a. a multi-sectioned transfer pinion having one pinion body section coordinating with the lower ordered counting wheel and a second pinion cap section coordinating with the higher ordered counting wheel, and

b. means within the multi-sectioned transfer pinion for delaying the rotation of the cap section until the body section has been rotated a predetermined distance.

8. In a counter having a plurality of counting wheels arranged in ascending order, rotatably mounted in a co-axial position, having a counting gear affixed to the side of each counting wheel which faces the lower ordered wheel, and having a driving gear and slide ring affixed to the side of each counting wheel, an improvement which delays the rotation of the higher ordered counting wheel until the next lower ordered wheel has completed essentially one revolution, comprising:

a transfer pinion having a plurality of sections, comprising:

a. a transfer pinion body section having gear-teeth on one side, rotatably mounted so that the gear-teeth cooperate with the driving gear and sliding ring of the lower ordered counting wheel,

b. a pinion cap section having gear-teeth on one side, rotatably mounted adjacent to the pinion body, so that the gear-teeth mesh with the counting gear on the next higher ordered counting wheel,

c. resilient means inside the transfer pinion body connected to the pinion body and the transfer pinion cap and biased to cause each to rotate in opposite directions until stopping means on each section engage each other,

d. means for permitting the pinion cap to rotate when the pinion body has rotated a predetermined distance, and

e. means for stopping the rotation of the pinion cap after it has rotated a predetermined distance.

9. Apparatus recited in claim **8** wherein the resilient means described in section (c) comprises:

a coil spring coaxially mounted inside the pinion body and pinion cap having either end connected to one of the pinion sections.

10. Apparatus recited in claim **8,** wherein said means described in sections (c) and (d) comprise:

a. a detent plate, rotatably mounted between the transfer pinion body and the transfer pinion cap, having notches around the inside diameter of the detent plate,

b. means for holding the detent plate stationary,

c. a pawl rotatably mounted in the pinion cap so as to place the pawl in such a position that the pawl can lodge into the notches on the detent plate, and

d. means attached to the transfer pinion body for disengaging the pawl from a notch in the detent plate when the pinion body has rotated a predetermined distance.

11. Apparatus recited in claim **10,** wherein the pinion body has a "Z" shaped member secured within the pinion body itself so that one end extends transversely into the same plane the detent plate lies in and in close proximity to the pawl.

12. Apparatus recited in claim **11** having in addition means for permitting "Z" shaped member to be deflected away from the pawl when the transfer pinion is rotated backwards.

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