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Müller

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[54] **INDICATION CORRECTING ARRANGEMENT FOR COUNTERS**

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[73] Assignee: **Kienzle Apparate GmbH**, Villingen, Germany

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[51] **Int. Cl.**.....**G06c 27/00**, G06c 15/42

[58] **Field of Search** .....235/117 R, 79, 94 R, 235/103, 95, 144 D, 1 C

[56] **References Cited**

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2,285,844 6/1942 Spaunburg.....235/117 R

2,814,444 11/1957 Bliss.....235/94 R

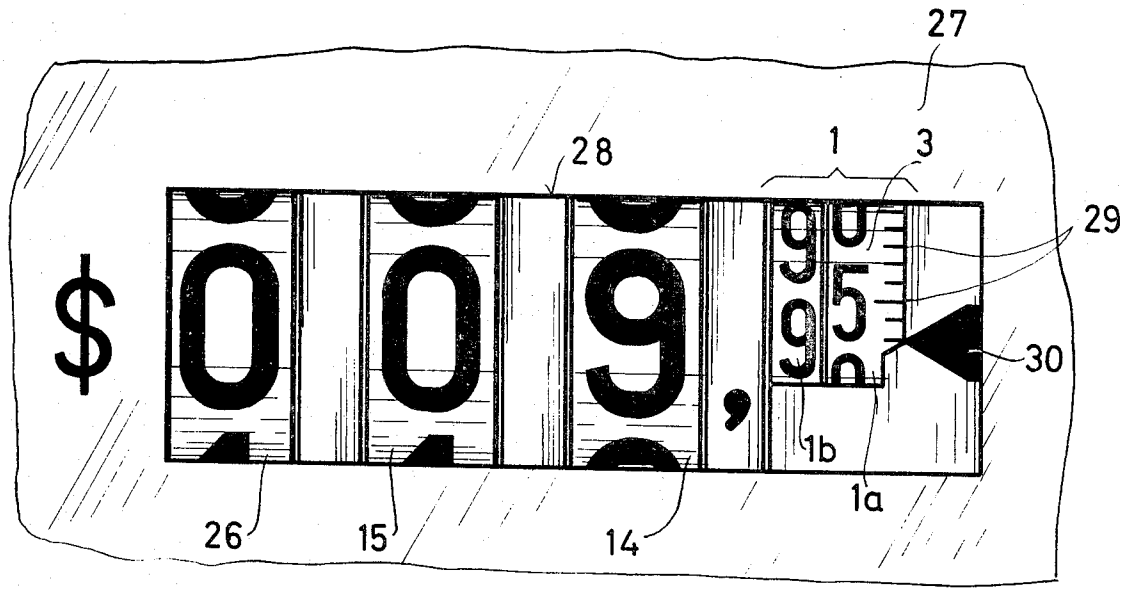
Primary Examiner—Stephen J. Tomsky

Attorney—Michael S. Striker

[57] **ABSTRACT**

A monetary counter has counter wheels for dollars and cents. The counter wheel of the lowest order counts cents up to 100, and represents the two lowest orders by first and second indicia on first and second counter wheel halves which are normally connected by coupling means. The second counter wheel half is connected by tens transfer means with the counter wheel counting and indicating dollars. When the value 99 cents is approached, the tens transfer means already turn the dollar counter wheel so far that it begins to show the following digit instead of the actually counted digit, causing errors. Resetting means are operated before reading out the counter, and reset the second counter wheel half, and thereby the dollar counter wheel, to a position indicating the actually counted dollars and cents.

12 Claims, 8 Drawing Figures



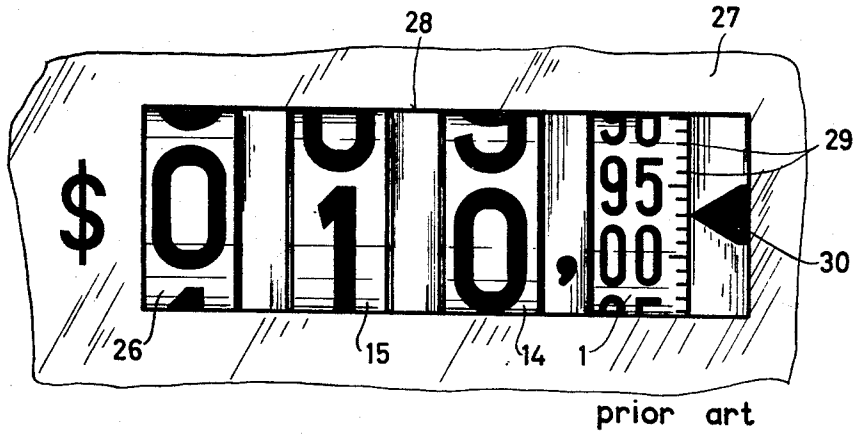

28
27
29
30
$
10,
95
00
26
15
14
1
prior art

FIG. 1

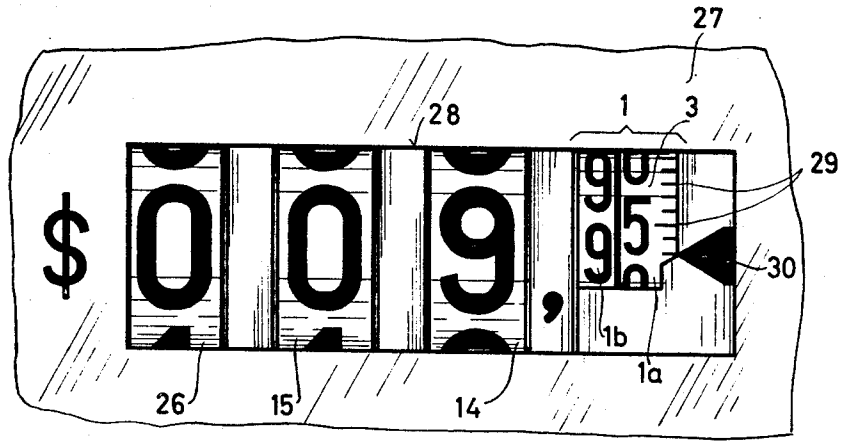

27
28
1
3
29
30
$
09,
95
1b
1a
26
15
14

FIG. 2

FIG. 3

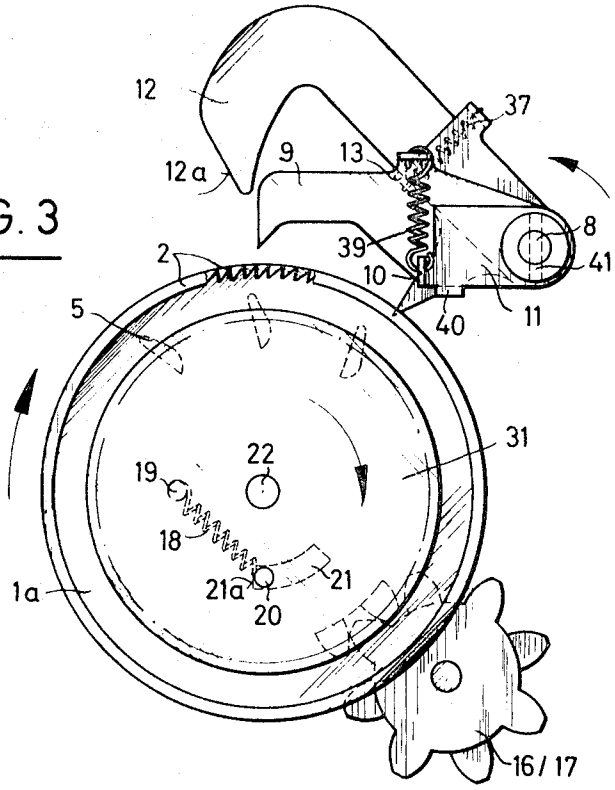
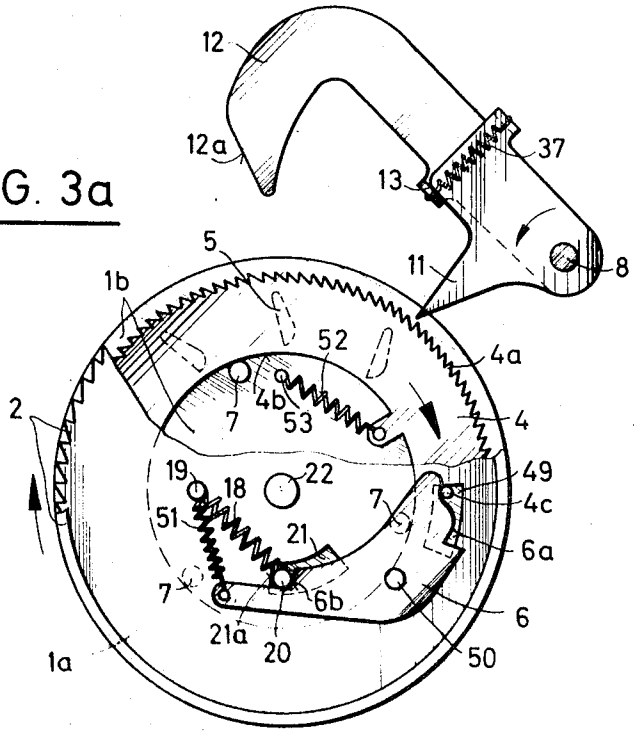

12
37
12a
9
13
8
39
41
2
10
5
40
11
31
22
19
18
1a
21a
21
20
16/17

FIG. 3a


12
12a
37
13
11
8
5
1b
52
4a
4b
7
53
4
2
49
19
18
22
4c
51
7
21
6a
7
6b
6
21a
20
50
1a

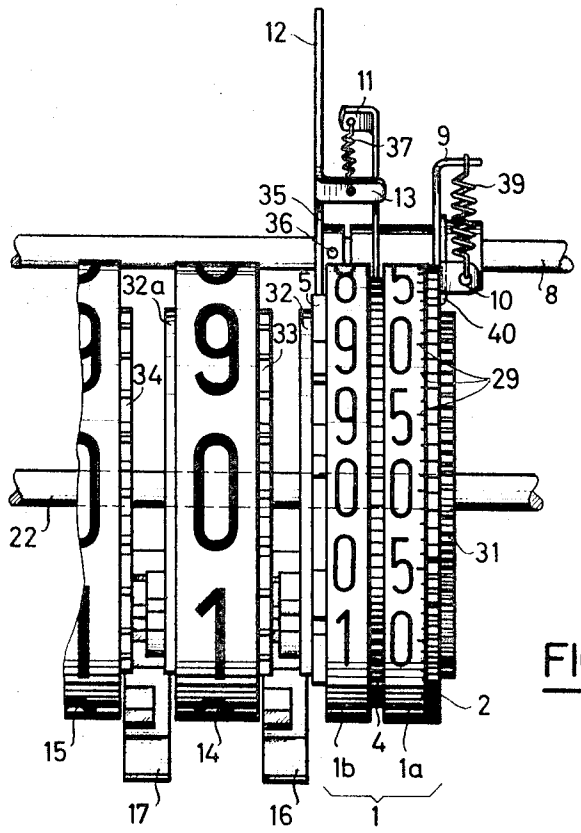

12
11
37
9
39
35
13
36
32a
32
5
10
8
40
33
34
29
22
31
2
15
14
4
1b
1a
17
16
1

FIG. 4

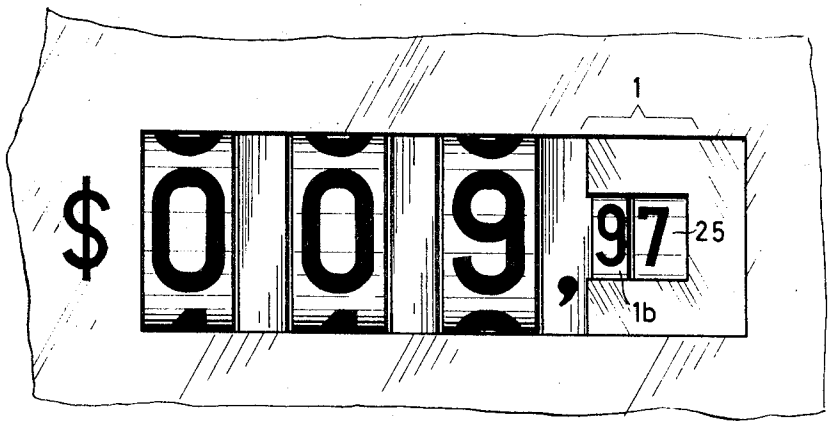
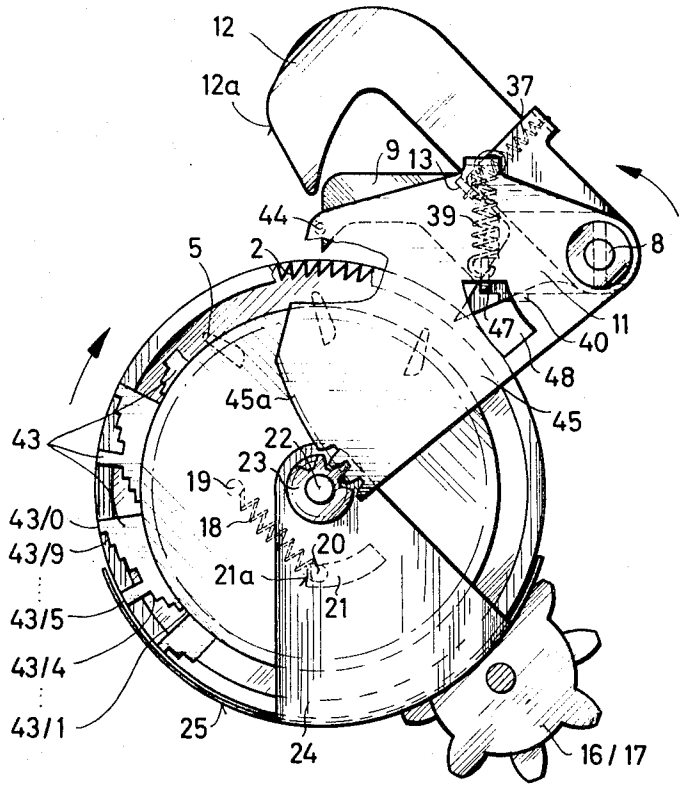

1
$
0
0
9
,
9
7
25
1b

FIG. 5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12a
37
9
13
44
39
8
5
2
47
11
40
48
45a
45
43
22
23
19
18
20
43/0
43/9
21a
21
43/5
43/4
43/1
25
24
16/17

FIG. 6

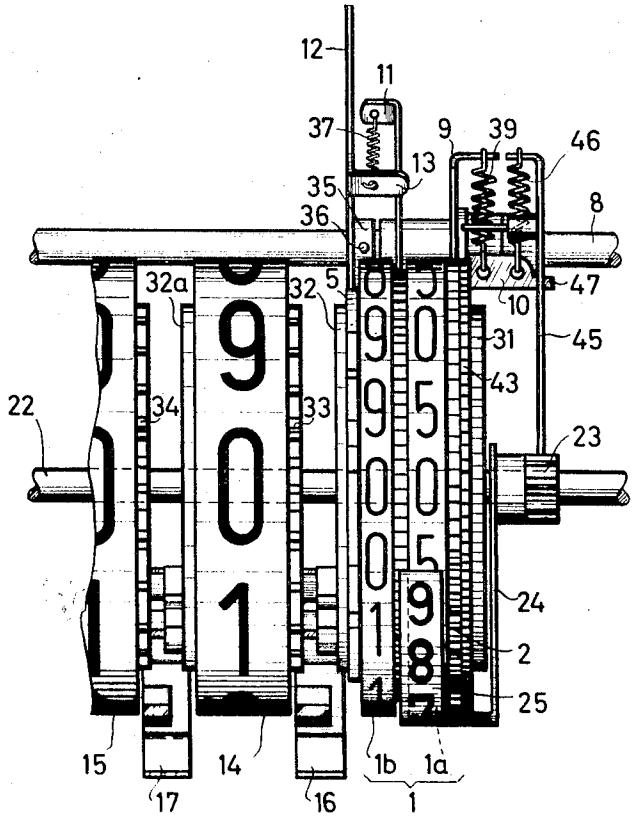
12
11
37
9
39
46
13
35
36
8
32a
32
5
47
10
31
45
43
22
34
33
23
24
2
25
15
14
1b
1a
17
16
1

FIG. 7

INDICATION CORRECTING ARRANGEMENT FOR COUNTERS

BACKGROUND OF THE INVENTION

The present invention relates to an arrangement for aligning and arresting indicia representing units counted by a counter. More particularly, the invention is concerned with counters having a continuously driven counter wheel in the lowest order from which the counter wheels of the higher orders are driven, the counter wheel of the lowest order having a two order indication.

In counters in which the counter wheel of the lowest order is driven to measure a variable, such as dispensed fuel or the monetary value of the dispensed fuel, the counter wheel of the lowest order, which may be called "initial" counter wheel can evidently stop in any position, including an intermediate position in which two indicia are simultaneously shown. If the smallest measured unit is very small compared with the registered amount per time unit, but is not permitted to be disregarded due to official regulations, the initial counter wheel is usually constructed to count and indicate a two order number. The division of the peripheral surface of a counter roller into 100 units, which are adapted to be read out at a distance, can only be obtained by providing indications for groups of at least five units, while the intermediate positions are only indicated by the graduation of a scale on the initial counter wheel, cooperating with the fixed indicator point. In a decadic system, it is required that for the movement of the counter wheel of the next higher order, and of every following order, an angular distance of 10 units of the lowest order must be run through.

For facilitating reading out of the aligned indicia indicating digits of the counted units, a cover is provided for the counter which has a window through which only the indicia representing the counted amount appear aligned along a reference line. While a counter wheel of a higher order is shifted due to the rotation of the initial counter wheel, the indicia digit of the next higher order is already visible in the window, although it is not yet accurately located along the reference line. When the counter is optically read out, errors may occur so that, for example in a monetary counter, instead of the correct amount of dollars 9.97, a wrong amount of dollars 10.97 appears to be indicated and may be paid by the customer who is not aware that the indicia "**10**" following indicia "**9**" has moved almost completely to the aligned position in the window, while the indicia "**9**" has already disappeared under the cover passing the edge of the window.

In order to overcome this disadvantage of counters according to the prior art, improved counters which after a counting operation are read out either visually or electrically have indicia wheels which can be reset to correct indicating positions, and are reset to a correct position particularly in the region in which the counter wheel of the respective next higher order is shifted. For a clear and unequivocal read-out of a counter position indicated by a graduated scale, the direction of rotation of the counter wheels has to be considered in order to associate the graduations with the next read out digit.

SUMMARY OF THE INVENTION

It is an object of the invention to provide an arrangement for resetting counter wheels of a higher order which have been already advanced almost one unit due to the rotation of the next lower counter wheel for almost one revolution, so that the counted value is correctly indicated by the indicia of the higher order.

Another object is to align all counter wheels before read-out so that the indicia indicate in all orders the actually counted values by indicia aligned along a reference line.

With these objects in view, the present invention provides an indication correcting arrangement for counter whose initial counter wheel is driven, and drives through transfer means the counter wheels of the respective higher orders. In accordance with the invention, the driven initial counter wheel is constructed of two separable counter wheels halves, which can be connected by coupling means for the counting operation, whereupon the coupling means is disengaged before the read-out operation. Resetting means are then either manually or automatically operated to reset the counter half correlated with the higher order so that the correct indicia are aligned along an imaginary reference line, which may be provided by the window in the counter cover.

An embodiment of the invention comprises counter means including first and second counter wheel means. The first counter wheel means is correlated with two lowest orders and includes a first counter wheel half having first indicia, and a second counter wheel half having second indicia representing a higher order than the first indicia. The second counter wheel means has indicating digits representing a third order and transfer means connecting the second counter wheel half with the second counter wheel means. The first counter wheel half is driven, and the rotary motion is transferred to the coupled second counter wheel half, and therefrom by transfer means to the second counter wheel means and to counter wheel means of even higher orders.

Coupling means have a coupling position for connecting the first and second counter wheel halves for rotation in an aligned position in which the first and second indicia are aligned along a reference line to represent a two order number so that when the first and second counter wheel halves rotate in the coupling position to represent a high two order number, the second counter wheel means is turned by the transfer means almost one step ahead. As a result, instead of the counted digit of the second counter wheel means, the next following digit is undesirably located substantially at the reference line.

Resetting means are provided which include a setting means, first control means operated by the setting means for moving the coupling means to a disengaged position so that the first and second counter wheel halves are turnable relative to the other, and second control means are then operated by the setting means for setting back the second counter wheel half. As a result, the respective second indicia is placed at the reference line, and at the same time the second counter wheel means is also set back by the transfer means to a position in which the counted digit thereof is located at the reference line.

Preferably, the resetting means include third control means operated by the setting means for arresting the first counter wheel half while the second counter wheel half is set back in the disengaged position of the coupling means.

In the modified embodiment of the invention, the setting means operate sensing means which sense the actually counted unit, and correspondingly place a mask carrying unit indicia over the first counter wheel half so that the counted units are indicated by digit indicia on the mask in the region of the reference line.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a fragmentary view of the indicating portion of a counter according to the prior art; erroneous

FIG. 2 is a fragmentary view of the indicating portion of a counter according to the present invention, indicating the same number as indicated in FIG. 1;

FIG. 3 is a schematic side view of an embodiment of the invention;

FIG. 3*a* is a schematic side view illustrating coupling means and resetting means for the two counter wheels halves of the invention;

FIG. 4 is a fragmentary front view of the embodiment of FIGS. 3 and 3*a*;

FIG. 5 is a fragmentary view of the indicating portion of a modified embodiment of the invention including a mask with indicia for indicating the counted units of the lowest order;

FIG. 6 is a schematic side view corresponding to FIG. 3, but illustrating the modified embodiment of FIG. 5; and

FIG. 7 is a fragmentary front view corresponding to FIG. 4 but illustrating the modified embodiment of FIGS. 5 and 6.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring first to FIG. 1, which illustrates the indicating region of a counter according to the prior art, four counter wheels **1**, **14**, **15**, and **26** are provided so that the counter is capable of counting dollars in three orders by counter wheels **14**, **15** and **26**, and cents by the counter wheel **1**. Counters of this type are used for indicating the amount due for fuel dispensed at a gas station. A read-out window **28** in a cover **27** shows the indicia aligned along a reference line given by the pointer **30**. In order to obtain suitable rotary speeds for the counter wheel **1**, its periphery is divided into a two order number, for counting up to 100 units. Due to the limited length of the peripheral surface of the counter wheels and the minimum size required for indicia, only groups of five units of the graduated scale **29** are represented by digit indicia. As shown in FIG. **1**, each group includes five units. The units are individually indicated by graduations **29**, the counted unit being indicated by the fixed mark **30** so that cents can be counted. In the prior art construction shown in FIG. **1**, a position is shown in which the counted number $9.97 is to be shown. However, since counter wheel **1** has been turned almost one revolution, counting 97 cents, the transfer means between counter wheels **1** and **14** have already been effective to advance the indicia representing "zero" to a visible position, almost located at the imaginary reference line determined by the fixed point **30**. The shifting of counter wheel **14** has also shifted counter wheel **15** to some extent so that the amount $10.97 appears to be indicated, although actually the amount $9.95 should have been indicated. Due to the fact that in the shifting region within the last ten units, the counter wheels **14** and **15** have already been shifted, the customer can be easily deceived by the improper indication.

FIG. **2** illustrates a corresponding arrangement according to the present invention. As will be explained hereinafter in greater detail, the initial counter wheel is divided into two halves **1***a* and **1***b* which can be coupled for rotation, and also separated for individual adjustment. After disengaging the coupling between the counter wheel halves **1***a* and **1***b*, and resetting counter wheel **1***b*, so that the respective indicia "**9**" is located along the reference line, the transfer means also reset counter wheels **14** and **15** so that the apparatus of the invention indicates $9.97 correctly in accordance with the count. The counter wheel half **1***b* for the 10 cents units, with the counter wheels **14**, **15** for the dollar units, is set back seven angular distances each of which corresponds to the smallest unit, the cent unit indicated by the graduated scale **29** on the first counter wheel half **1***a*. Counter wheel half **1***a* is arrested in a position in which a unit graduation is aligned with the fixed reference point **30**.

As shown in FIGS. **3**, **3***a*, and **4**, the counter wheels **1**, **14** and **15** are mounted for rotation on a counter shaft **22**. Counter wheel half **1***a* is driven, counter wheel half **1***b* is connected by transfer means to counter wheel **14**, and counter wheel **14** is connected by transfer means to counter wheel **15**.

On the cylindrical peripheral surface of counter wheel half **1***a*, the smallest units are represented by a graduated scale **29** as described with reference to FIG. **2**. For each five units of the graduated scale **29**, a digit indicia "**0**" and "**5**" is provided on the periphery of counter wheel half **1***a*. The indicia on the peripheral surface of counter wheel half **1***b* represent 10 cents units, pairs of the same digits being provided to be able to form numbers "**90**" and "**95**" with the indicia of counter wheel half **1***a*, when the same are coupled in the illustrated aligned position.

Counter wheel half **1***a* has on its right side, as viewed in FIG. **4**, annular arresting means **2** which has teeth spaced by recesses corresponding to the graduations of the scale **29**. Counter wheel half **1***a* also carries a gear **31** through which it is driven to rotate on counter shaft **22**. Gear **31** is omitted in FIG. **3***a* for clearly showing the position of lever **6**. In FIG. **4**, lever **6** is covered by annular arresting means **2**. It is possible to combine the annular arresting means **2** with the drive gear **31**, and select a suitable shape for the teeth of the combined gear.

In the direction toward higher orders, the counter wheel half **1***a* has three laterally projecting bolts **7** on

which a setting ring 4 is mounted for limited angular movement in clockwise direction. For returning the setting ring 4 in the opposite direction, a spring 52 which is secured to a pin 53 of the counter half 1*a*, is provided so that the setting ring 4 is pulled back to an initial position. For this purpose, a projection 4*c* in the form of a pin secured to setting ring 4 projects through a lateral cutout 49 in counter wheel half 1*a* so that the initial position of the setting ring 4 is determined. Projecting pin 4*c* also engages a cam surface 6*a* on a coupling lever 6 which is pivotally mounted on a pin 50 carried by the counter wheel half 1*a*. A spring 51 connected to a pin 19 carried by counter wheel half 1*a* is connected to the end of coupling lever 6 and turns the same in clockwise direction so that cam surface 6*a* abuts projection 4*c* of the setting ring 4. When setting ring 4 is turned in the clockwise direction, projection 4*c*, acting on the cam surface 6*a*, turns coupling lever 6 against the action of the spring 51. In FIG. 3*a*, coupling lever 6 is shown in a coupling position connecting the counter wheel halves 1*a* and 1*b* for rotation. Spring 51 holds the coupling lever 6 against a stop pin 20 which is secured to the counter wheel half 1*b*. An abutment shoulder 6*b* of coupling lever 6 abuts the stop pin 20 which is connected by spring 18 with the bolt 19 on coupling wheel half 1*a*. Consequently, stop 20 is pulled against the end wall 21*a* of a circumferential cutout 21 in the counter wheel half 1*a*. In this manner, counter wheel halves are coupled for rotation together. The setting ring 4 has peripheral teeth 4*a* cooperating with a pawl lever 11 so that by operation of pawl lever 11, the setting ring 4 can be turned in clockwise direction to displace projection 4*c* and to move coupling lever 6 to a disengaged position releasing stop 20 so that the coupling wheel halves 1*a* and 1*b* can be turned relative to each other.

On the side of coupling wheel half 1*b* remote from coupling wheel half 1*a*, 10 alignment cams 5 are arranged in a circumferential row spaced 36° from each other. Additionally, the conventional control edge 32 with a double tooth for stepwise driving the tens transfer drive 16 or 17 is provided substantially as described in U.S. Pat. No. 2,814,444. During the resetting of counter wheel half 1*b*, the cam end portion 12*a* of the aligning arm 12 enters into the space between two adjacent alignment cams 5 so that counter wheel half 1*b* is placed in a condition in which one of its indicia digits is aligned along the imaginary reference line determined by the fixed point mark 30. The turning moment exerted by the aligning arm 12 acts on the alignment cams 5 and on counter wheel half 1*b* in the direction opposite to the positive counting direction. During the tens transfer phase, the double tooth, not shown, cooperates with the respective tens transfer means 16, 17 to transmit to the respective drive gear 33 and 34, respectively, and to the next higher order a motion representing the unit carried to the next order, in the usual manner.

The aligning arm 12 with the cam end portion 12*a* is secured to a bushing 35 by a pin 36, and connected with a resetting shaft 8 which extends parallel to the counter shaft 22. Shafts 8 and 22 are mounted in walls of the housing of the counter, not shown. When a counting operation has been completed, the resetting shaft 8 is turned in a suitable manner. For example, the manually operated dispensing valve of a gas station, when placed on a rest after the completion of a fueling operation, causes the turning of resetting shaft 8 in counterclockwise direction. For taking along the pawl lever 11, the aligning arm 12 has a coupling arm 13 on which the pawl lever 11 abuts due to the action of a spring 37 which constitutes a resilient connection between the aligning arm 12 and the pawl lever 11. In axial direction, pawl lever 11 is positioned to cooperate with the toothed periphery 4*a* of the setting ring 4, and the aligning arm 12 to cooperate with the aligning cams 5.

Furthermore, the resetting shaft 8 supports a locking pawl 9 in a position cooperating with the annular arresting means 2. A spring 39 holds locking pawl 9 in abutment with the projection 40 of a coupling arm 10 so that locking pawl 9 follows the movement of coupling arm 10 which is fixedly secured to the setting shaft 8 by a pin 41.

Between the pot-shaped counter wheel halves 1*a* and 1*b*, a pin 19 secured to counter wheel half 1*a*, and a pin 20 secured to counter wheel half 1*b* are provided which are connected by a spring 18, as explained above. The stop 20 in the counter wheel half 1*b* projects into the sector-shaped cutout 21 and causes stop 20 to abut the edge 21*a* of cutout 21 in the initial position of the apparatus, which conforms to the coupling of counter wheel halves 1*a* and 1*b* by the coupling lever 6.

After completion of a counting operation during which the counter wheel half 1*a* is continuously driven, and causes turning of the counter wheels 14 and 15 of the higher orders by the tens transfer means, the counter is to be read out. For this purpose, the resetting shaft 8 is operated, for example due to the placing of a discharge valve on a rest.

During a first phase of the resetting operation, the locking pawl 9 is resiliently taken along by the coupling arm 10, and aligns the counter wheel half 1*a* by engaging with its pointed end, the peripheral recesses of the annular arresting means 2. In this manner, a graduation of the graduated scale 29 is exactly aligned with the point of the fixed mark 30, corresponding to the nearest cent value. During further turning movement of resetting shaft 8, the pawl lever 11 becomes effective during a second phase, and is resiliently taken along by the aligning arm 12 until pawl lever 11 engages the peripheral teeth and recesses of setting ring 4 and turns the same in clockwise direction against the action of spring 52.

At the same time, the projecting pin 4*c* on the setting ring 4 moves along the circumferential cutout 49 in the counter wheel half 1*a*, and engages the cam surface 6*a* to turn coupling lever 6 in counterclockwise direction against the action of spring 51. As a result, the locking shoulder 6*b* releases the stop pin 20 of the counter wheel half 1*b* for movement into the open portion of the cutout 21, so that the coupling between the counter wheel halves 1*a* and 1*b* is disengaged.

During further continuation of the turning movement of resetting shaft 8, the cam end portion 12*a* of the aligning arm 12 acts on one of the aligning cams 5 to turn the counter wheel half 1*b* counterclockwise against the counting direction and against the force of spring 18 until the counter wheel half 1*b* is returned to the last position in which an integral number was in-

dicated. For example, as shown in FIG. 2, the center of the digit 9 is aligned with the pointed mark 30, instead of being located aligned with the digit 5, in which aligned position, the counter wheel halves 1*a* and 1*b* were coupled during the counting operation.

When the counter wheel half 1*b* is reset, the counter wheels 14, 15 and 26 of the higher orders are also reset to a position in which the indicating digits are aligned along a reference line determined by the pointed mark 30. The resetting movement of the counter wheel half 1*b* is transferred by the tens transfer means 16 to counter wheel 14, and transferred from counter wheel 14 to counter wheel 15, and so forth.

In the event that the cam end portion 12*a* of the aligning arm 12 moves exactly and symmetrically into the space between two aligning cams 5, the counter wheel half 1*b* must be in the correct position, together with the counter wheels of the higher orders, and no resetting is necessary, or effected. After resetting shaft 8 has been turned the required angle, all counter wheels and the counter wheel halves 1*a* and 1*b* are in the correct position in which no erroneous reading of the indicated number is possible. This position of the counter is maintained until the resetting shaft 8 has been returned to its initial position whereupon a new counting operation, followed by a new resetting operation, may start.

Before the continuation of the counting operation, or before the beginning of a new counting operation, and always before the clearing of the counter, the resetting shaft 8 returns to its initial position, and all counter wheels 1, 14, 15 and 26 return to the initial position which they had before the resetting. Spring 18 brings back the counter wheel half 1*b* including all counter wheels 14, 15 and 26 of the higher orders to the previous counter position within the intermediate region, and in this position, coupling lever 6 couples the two counter wheel halves 1*a* and 1*b* again.

From the above description it becomes apparent that the resetting means of the invention includes a setting means in the form of resetting shaft 8, first control means 11, 4*a*, 4, 4*c*, 6 operated by the resetting shaft 8 for first moving the coupling means 6 to the disengaged position whereupon second control means 12, 12*a*, 5 are operated by the resetting shaft 8 for setting back the counter wheel half 1*b* so that the respective indicia is placed at the reference line 30.

The resetting means include third control means 9, 2, operated by the resetting shaft 8 for arresting the counter wheel half 1*a* while the counter wheel half 1*b* is set back in the disengaged position of the coupling means 6, 20.

The third control means acts first during operation of the resetting shaft 8, and includes annular arresting means 2 secured to the counter wheel half 1*a*, and a spring biassed locking pawl 9 which engages an arresting tooth of the annular arresting means 2.

The coupling means include a coupling member or lever 6 pivotally mounted on pin 50 on the counter wheel half 1*a*, a spring 51 connecting the counter wheel half 1*a* with the coupling member 6, a stop 20 on the counter wheel half 1*b* urged by spring 18 against the counter wheel half 1*a* and engaged by the coupling member 6.

The coupling member 6 has a cam surface 6*a*, and the setting ring 4 of the first control means is turnably mounted on the counter wheel half 1*a* and has peripheral recesses engaged by pawl lever 11 when the resetting shaft 8 is operated.

The second control means include a plurality of aligning cams 5 secured to the counter wheel half 1*b*, and aligning means including aligning arm 12 and the cam end portion 12*a* which move under control of the resetting shaft 8 into a space between any two aligning cams 5.

In the modified embodiment, the reading out of a graduated scale 29 is eliminated since it is more desirable to indicate even the smallest units by indicia digits. In the embodiment illustrated in FIGS. 6 and 7, the counter wheel half 1*a* is provided with stepped abutments 43, and the radial extension of the abutment portions 43/1 to 43/4 and 43/6 to 43/9 is a measure for the sensing movement of sensing means, constituted by a gear segment 45 with a laterally projecting sensing pin 44. The gear segment 45 is moved in counterclockwise direction through the spring 46 by the arm 10 of the resetting shaft 8, and returned in clockwise direction by the projection 47 in the slot 48 until it is in the initial position. The segment-shaped gear portion 45*a* of gear sector 45 meshes with a gear 23 which is fixedly connected with a sector-shaped mask 24 and turnably mounted on the counter shaft 22. The transverse portion of the sector-shaped mask 24 carries a series of digits 25, for example the digits 1 to 4 and 6 to 9 which are those digits which are not already provided on the counter wheel half 1*a*.

Depending on the number of counted units between "0" and "5," the mask 24, driven by the resetting shaft 8, senses the respective abutment portion of the respective abutment 43, and assumes a position covering the peripheral portion on the right side of the counter wheel half 1*a*. Corresponding to the radial dimension of the abutment portion 43/1 to 43/9 which is sensed by the pin 44, the indicating digit of the series of digits 25, representing the intermediate unit, moves into the window, as shown in FIG. 5. Corresponding to the seven units of the graduated scale in FIG. 2, the digit indicia "7" is placed by the mask 24 at the reference line in which the other digit indications are located. If the number of counted units is "0" or "5" units, the mask 24 is not placed in the operative position covering a portion of counter wheel half 1*a* since the indicating digits "0" and "5" are already printed on the counter wheel half 1*a*. Before the clearing of the counter, and the start of a new counting operation, the movement of the resetting shaft back to its initial position also places the mask 24 in its initial position.

It is a particular advantage of the invention that when intermediate numbers of units are indicated, a simple resetting means effects the resetting of the respective counter wheels to a position indicating the counted number, not only in the counter wheel of the lowest order, but also in all counter wheels associated with higher orders of the number. The correction of the position of the indicating digits by the resetting means of the invention, is of particular importance if the counter is automatically optically read out. For such a read-out operation, it is absolutely required that all indicating indicia are set to the correct position indicat-

ing the counted number. The device of the invention consists of simple mechanical parts, and obtains the desired result by setting and aligning only the counter wheel of the lowest order, while the counter wheels of the higher orders are automatically reset to the correct position by the conventional transfer means between the counter wheels of consecutive orders. Due to the fact that in the present invention neither the drive of the counter, nor the transfer means between the counter wheels of successive orders are ever disconnected, the apparatus is particularly suited for additive counter registers which, at predetermined intervals, are read out, and then continue the counting operation without being cleared. This is due to the fact that all counter wheels are returned automatically to initial positions when the resetting shaft 8 is returned to its initial normal position.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of indication correcting arrangements for counters differing from the types described above.

While the invention has been illustrated and described as embodied in an indication correcting arrangement for counters in which the counter wheel of the lowest orders counts 100 units, and is divided into two counter wheel halves, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims. What is claimed as new and desired to be protected by Letters Patent is set forth in the appended claims.

I claim:

1. Indication correcting arrangement for counters, comprising counter means including at least first and second counter wheel means, said first counter wheel means being correlated with the two lowest orders and including a first counter wheel half having first indicia, and a second counter wheel half having second indicia representing a higher order than said first indicia, said second counter wheel means having indicating digits representing the third order, and transfer means connecting said second counter wheel half with said second counter wheel means; drive means for rotating said first counter wheel half; coupling means having a disengaged position, and a coupling position for connecting said first and second counter wheel halves for rotation in an aligned position in which said first and second indicia are aligned along a reference line to represent a two order number so that when said first and second counter wheel halves rotate in said coupling position to represent a high two order number, said second counter wheel means is turned by said transfer means almost one step ahead whereby instead of the counted digit of said second counter wheel means, the next following digit is undesirably located substantially at said reference line; and resetting means including a setting means, first control means operated by said setting means for moving said coupling means to said disengaged position so that said first and second counter wheel halves are turnable relative to each other, and second control means then operated by said setting means for setting back said second counter wheel half so that the respective second indicia is placed at said reference line whereby said second counter wheel means is also set back by said transfer means to a position in which the counted digit thereof is located at said reference line.

2. Indication correcting arrangement as claimed in claim 1 wherein said resetting means include third control means operated by said setting means for arresting said first counter wheel half while said second counter wheel half is set back in said disengaged position of said coupling means.

3. Indication correcting arrangement as claimed in claim 2 wherein said third control means include annular arresting means secured to said first counter wheel half and having a number of arresting teeth equal to the number of units represented by said first indicia, and a spring biassed locking pawl operated by said resetting member to engage one of said arresting teeth.

4. Indication correcting arrangement as claimed in claim 1 wherein said coupling means includes a coupling member pivotally mounted on said first counter wheel half, a spring connecting said first counter wheel half with said coupling member, a spring biassed stop on said second counter wheel half, urged against said first counter wheel half and engaged by said coupling member, said coupling member having a cam surface; wherein said first control means includes a setting ring turnably mounted on said first counter wheel half, and having peripheral teeth and recesses, and a pawl lever operated by said resetting member to engage said peripheral recesses and to turn said setting ring, said setting ring including a projection cooperating with said cam surface for moving said coupling member to a position releasing said stop whereby said coupling means is disengaged.

5. Indication correcting arrangement as claimed in claim 1 wherein said second control means includes a plurality of aligning cams secured to said second counter wheel half and arranged in a row extending in circumferential direction, the number of said aligning cams corresponding to the number of second indicia, and an aligning means operated by said setting means to move into the space between any two aligning cams for turning back said second counter wheel half so that the respective second indicia is placed at said reference line.

6. Indication correcting arrangement as claimed in claim 5 wherein said setting means includes a resetting shaft; wherein said aligning means includes an aligning arm fixedly carried by said resetting shaft, and having a cam end portion fitting between two adjacent alignment cams; and wherein said first control means include a setting ring turnably mounted on said first counter wheel half and having peripheral teeth and recesses, a pawl lever freely rotatably mounted on said resetting shaft, and spring means connecting said pawl lever with said aligning arm and urging said pawl lever

into engagement with said recesses of said setting ring to turn said setting ring by the action of said spring means, said turned setting ring being operatively connected with said coupling means for moving said coupling means to said disengaged position.

7. Indication correcting arrangement as claimed in claim 6 wherein said coupling means includes a coupling lever pivotally mounted on said first counter wheel half, a first spring connecting said first counter wheel half with said coupling lever, a stop on said second counter wheel half located in a circumferential slot of said first counter wheel half, engaged by said coupling lever under the action of said first spring, a second spring connecting said stop with said first counter wheel half so that said stop is biassed toward one end of said slot whereby said second counter wheel half is connected for limited relative setting movement with said first counter wheel half until said second spring returns said second counter wheel half to a normal position in which said stop abuts said end of said slot, said first and second indicia being aligned along said reference line in said normal position.

8. Indication correcting arrangement as claimed in claim 1 wherein said first counter wheel half has a scale with graduations indicating measured units; wherein said first indicia represent groups of said units and are disposed adjacent said scale; and wherein each first indicia extends along a corresponding group of said graduations.

9. Indication correcting arrangement as claimed in claim 1 wherein said second counter wheel half has second indicia representing groups of units counted by said first counter wheel half; and further comprising a plurality of stepped radial abutments on said first counter wheel half, each stepped abutment having a group of stepped abutment portions correlated with a group of units, respectively; sensing means actuated by said setting means for sensing said abutment portions of each abutment; and mask means for said first counter wheel half having said first indicia in the form of indicating digits representing said units, and being controlled by said sensing means to assume a position for indicating at said reference line by said indicating digits the units counted by said first counter wheel half.

10. Indication correcting arrangement as claimed in claim 9 wherein said setting means includes a resetting shaft; wherein said sensing means include a spring biassed gear segment mounted on said resetting shaft and having a sensing pin, said gear segment being operated by said resetting shaft so that said sensing pin senses one of said abutment portions; and gear means connecting said gear segment with said mask means.

11. Indication correcting arrangement as claimed in claim 10 wherein said counter means include a counter shaft on which said second counter wheel means and said second counter wheel half are mounted for rotation; wherein said mask means is fixedly mounted on said counter shaft for angular movement; and wherein said gear means include a gear mounted on said counter shaft meshing with said gear segment and secured to said mask means so that said mask means is turned an angle depending on the radial height of the abutment portion sensed by said sensing pin of said segment.

12. Indication correcting arrangement as claimed in claim 11 wherein each second indicia is a digit representing a group of counted units; and wherein the indicia on said mask means are digits representing the digits intermediate said digits of said second indicia.

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