United States Patent

Smilgys et al.

[15] **3,668,375**

[45] **June 6, 1972**

[54] PRINTER

[72] Inventors: **Bruno S. Smilgys**, Hartford, Conn.; **Robert C. Ritchie**, Feeding Hill, Mass.

[73] Assignee: **Veeder Industries Inc.**, Hartford, Conn.

[22] Filed: **Oct. 13, 1970**

[21] Appl. No.: **80,260**

[52] **U.S. Cl.** .....**235/94 R**, 222/30, 346/43

[51] **Int. Cl.**.....**B67d 5/22**

[58] **Field of Search**.....235/58 R, 94 R, 94 A; 101/91, 101/92, 93 C; 222/30

[56] **References Cited**

UNITED STATES PATENTS

2,612,428	9/1952	Vroom	222/30 X
3,139,027	6/1964	Norman	235/94 X
3,369,704	2/1968	Manke	222/30
3,446,432	5/1969	Smilgys	235/94

Primary Examiner—Richard B. Wilkinson
Assistant Examiner—Stanley A. Wal
Attorney—Prutzman, Hayes, Kalb & Chilton

[57] **ABSTRACT**

A gasoline pump printer having a cost printing counter, a serial printing counter, and a date printer and operable at the end of each gasoline delivery for printing a record of the delivery. A printer operating shaft is connected to rotate the supporting shafts of the cost and serial counters and date printer one full revolution to (a) rotate the print wheels to perform a printout, (b) reset the cost counter print wheels to "0," and (c) index the serial counter for printing the next serial count, and to operate a shearing mechanism for shearing the printed delivery record from a paper roll.

8 Claims, 6 Drawing Figures

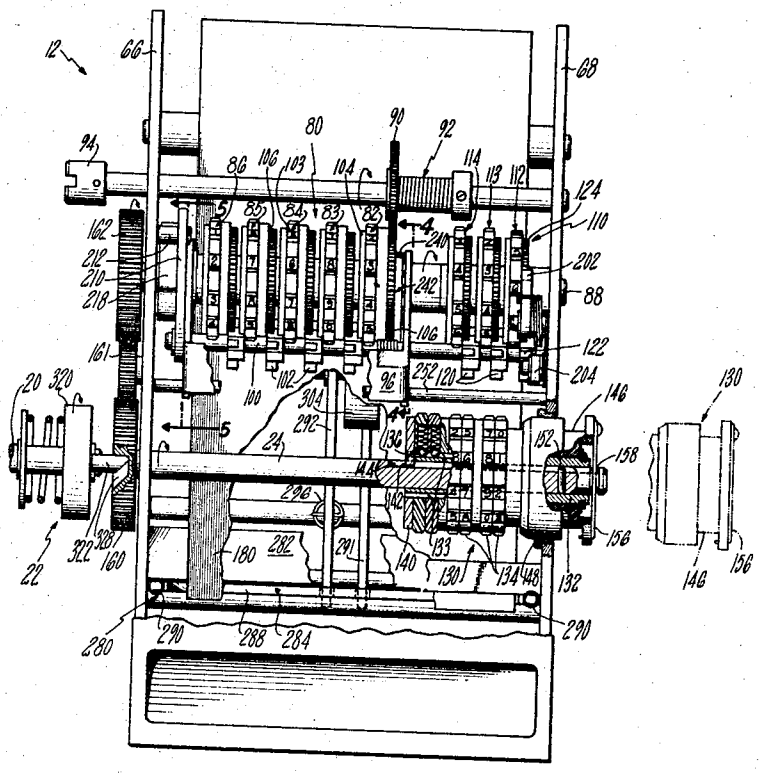


FIG. 1

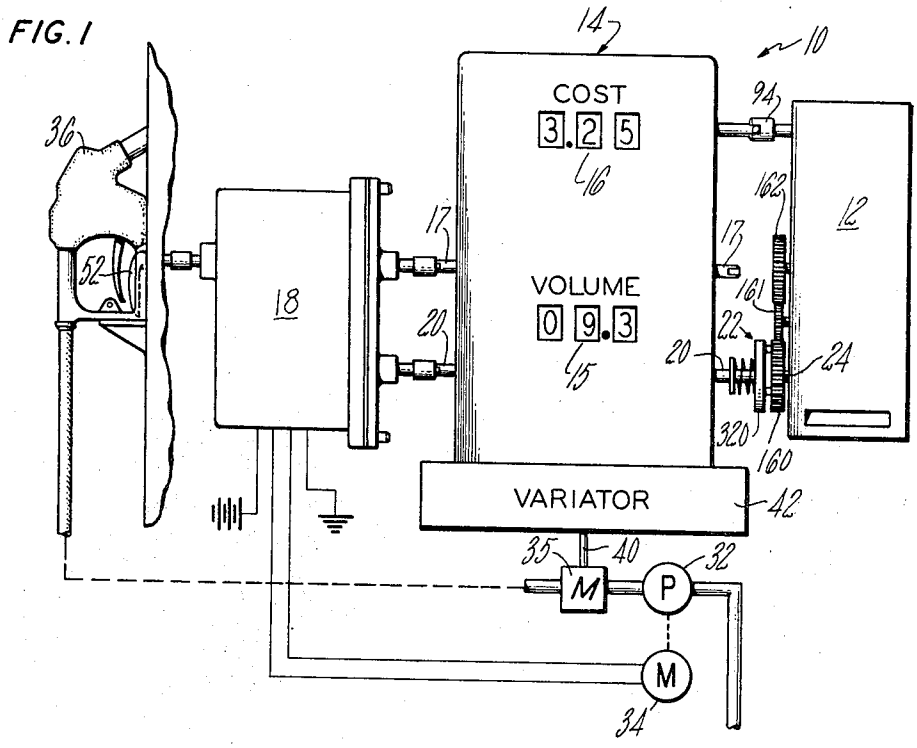


FIG. 4

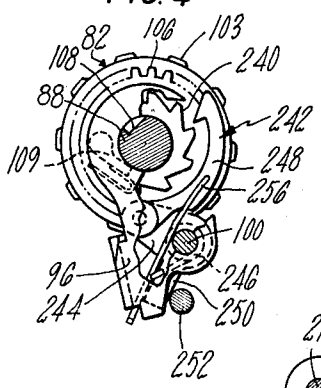
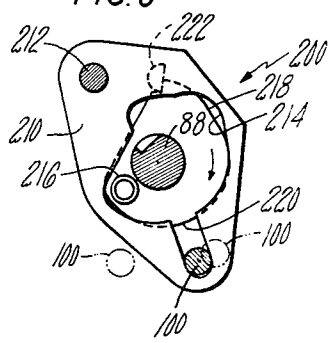


FIG. 6



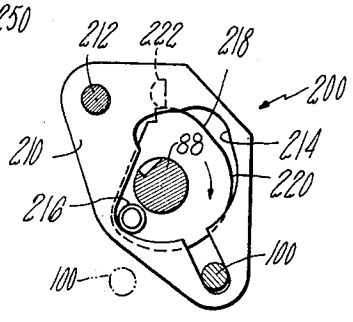


FIG. 5

INVENTORS
BRUNO S. SMILGYS
ROBERT C. RITCHIE

BY Brutzman, Hayes, Gail and Chilton

ATTORNEYS

FIG. 2

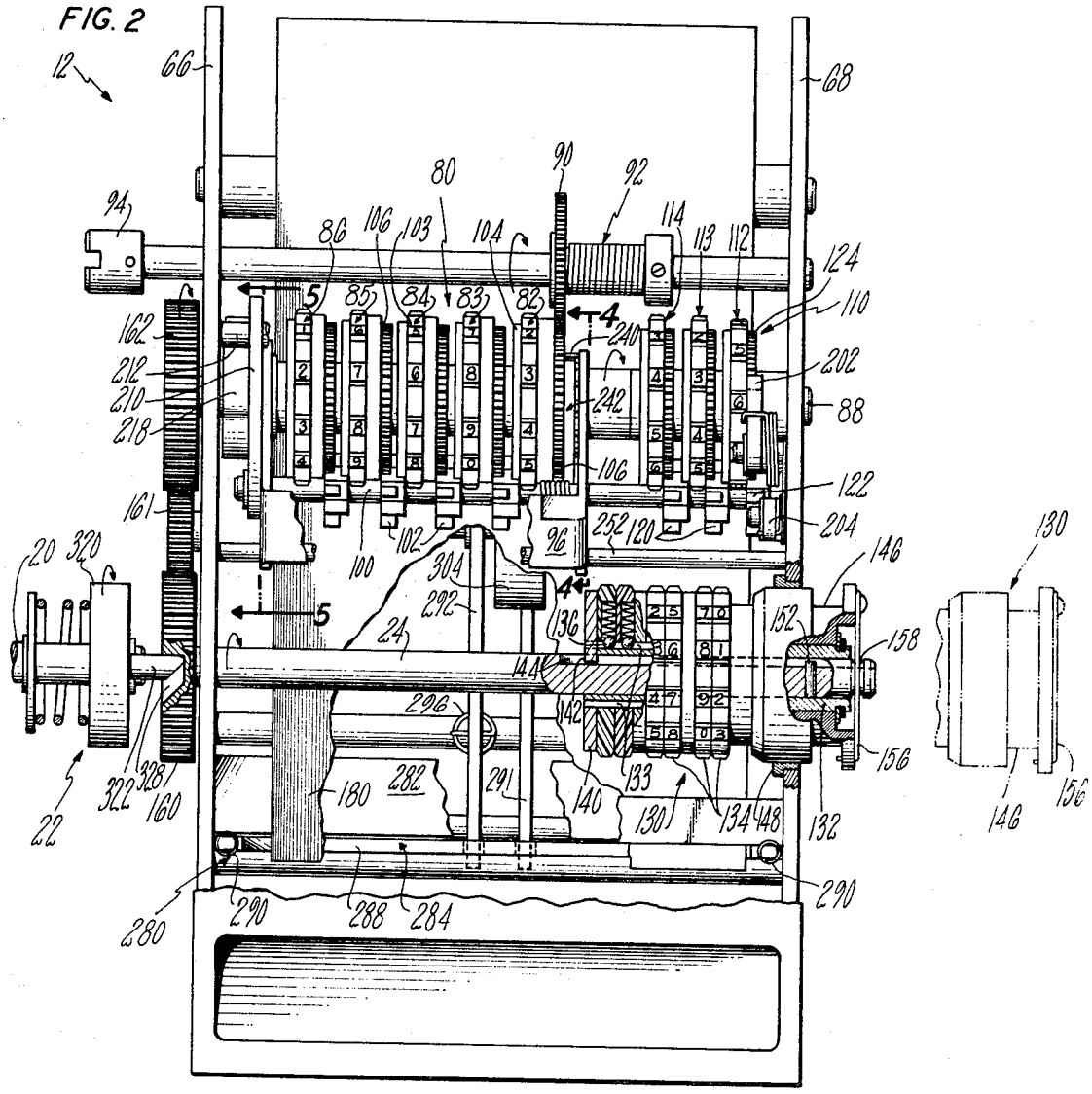
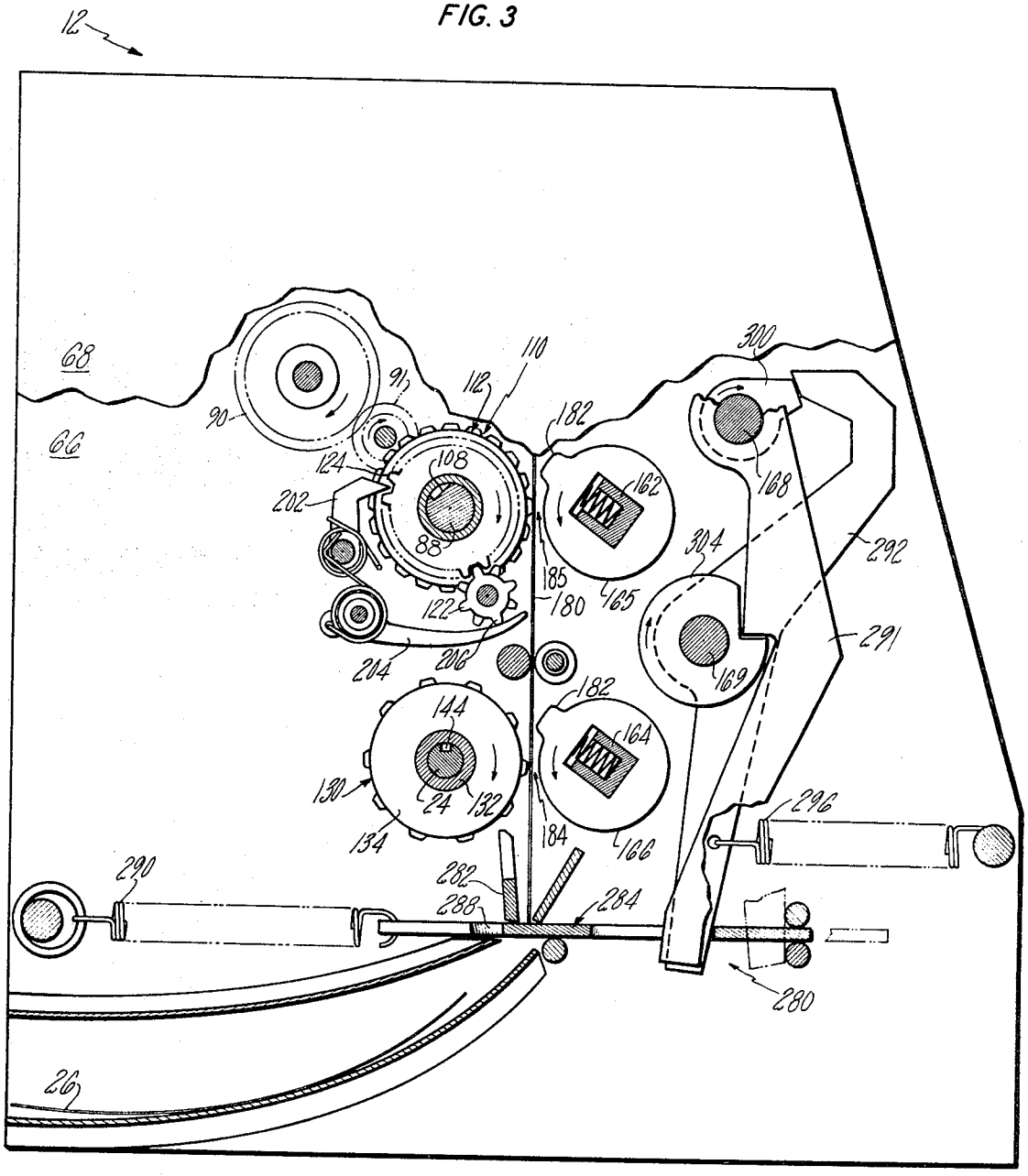

12
66
68
80
90
92
94
86
106
103
104
114
113
112
124
110
5
85
84
83
82
4
240
162
212
210
218
242
202
88
106
122
161
102
96
252
120
204
130
20
320
100
304
4
146
5
292
136
24
152
158
144
296
142
156
322
328
160
180
282
291
140
133
130
134
148
132
146
156
22
280
290
288
284
290

FIG. 3


12
68
66
90
91
110
112
182
124
108
202
88
162
185
180
165
122
204
206
300
168
304
292
291
169
144
130
24
132
134
164
166
184
296
290
282
288
284
280
26

PRINTER

BRIEF SUMMARY OF THE INVENTION

The present invention relates generally to printers and more particularly to a new and improved printer having notable utility in fuel dispensing apparatus for providing a printed record of each fuel delivery.

It is a primary aim of the present invention to provide a new and improved printer for fuel dispensing apparatus operable at the completion of each fuel delivery for printing a record of the fuel delivery.

It is another aim of the present invention to provide a new and improved printing counter having a counter shaft rotatable through one revolution for sequentially rotating the print wheels for producing a printout and resetting the print wheels to "0."

It is a further aim of the present invention to provide a new and improved serial printing counter having a counter shaft rotatable through one revolution for sequentially producing a printout and indexing the serial counter for the succeeding printout.

It is another aim of the present invention to provide a new and improved printer of the type having a plurality of coaxial manually settable print wheels.

It is a further aim of the present invention to provide a new and improved shearing mechanism for a printer for severing the printed record from a paper roll.

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

A better understanding of the invention will be obtained from the following detailed description and the accompanying drawings of an illustrative application of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

FIG. **1** is a generally schematic representation, partly broken away, of a gasoline delivery pump employing a printer incorporating the present invention;

FIG. **2** is an enlarged front elevation view, partly broken away and partly in section, of the printer;

FIG. **3** is an enlarged side elevation view, partly broken away and partly in section of the printer;

FIG. **4** is a partial section view, partly broken away and partly in section, taken substantially along line **4—4** of FIG. **2** and showing a ratchet mechanism of the printer; and

FIGS. **5** and **6** are partial section views, partly in section, taken substantially along line **5—5** of FIG. **2** and showing a cam mechanism of the printer in normal and intermediate operating positions thereof.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings in detail wherein like numerals represent like parts, a gasoline delivery pump **10** employing a printer **12** incorporating the present invention is shown comprising a delivery register **14** (for example of the type disclosed in U. S. Pat. No. 3,216,659 of Edward C. Ambler et al. dated Nov. 9, 1965 and entitled "Resetting Control Mechanism for Counting Device") having volume and cost counters **15**, **16** for registering the volume and cost of each fuel delivery and a reset shaft **17** adapted to be rotated one revolution for resetting the volume and cost counters **15**, **16** to "0."

An electrical drive unit **18** (for example of the type disclosed in the commonly assigned copending U. S. Pat. application Ser. No. 71,997 of Silvio Conte filed Sept. 14, 1970 and entitled "Drive Unit for Fluid Delivery Pump") is mounted on the left side of the register **14** for rotating the reset shaft **17** one revolution for resetting the register prior to the commencement of each fuel delivery. The electrical drive unit **18** is also connected via an intermediate shaft **20** and a coupling **22** to rotate a printer operating shaft **24** one revolution after the completion of each fuel delivery for sequentially printing a ticket or receipt **26** and resetting the printer for the succeeding fuel delivery. In a conventional manner the gasoline delivery pump **10** incorporates a fuel pump **32** driven by an electric motor **34** for delivering gasoline from a suitable source (not shown) through a fluid meter **35** to a dispensing nozzle **36**. The output or volume shaft **40** of the meter **35** is connected for driving the volume counter **15** for registering the volume of fuel delivered and for driving a variator **42** (for example of the type disclosed and described in U. S. Pat. No. 3,413,867 of Richard B. Hamlin dated Dec. 3, 1968 and entitled "Variator"). The variator **42** is connected for driving the cost counter **16** for registering the cost of the fuel delivered in accordance with the volume of fuel delivered and a unit volume price established by the variator setting. As described more fully in said copending U. S. Pat. application Ser. No. 71,997 of Silvio Conte, the electric drive unit **18** is operable by a handle **52** such that when the handle is rotated (e.g., 90° in the counterclockwise direction) to its horizontal or "On" position, the electric drive unit **18** is operated to rotate the reset shaft **17** one revolution for sequentially resetting the register **14** and conditioning the pump **10** for delivering gasoline. When the operating handle **52** is rotated in the opposite direction to its "Off" or vertical position shown in FIG. **1**, the electrical drive unit **18** is operated for sequentially de-energizing the pump motor **34** and rotating the printer operating shaft **24** one revolution.

The printer **12** comprises a frame with a pair of side plates **66**, **68** and a number of rotary shafts extending between the side plates. A cost printing counter **80** is provided for printing the cost of each fuel delivery and if desired a similar volume printing counter may be provided for printing the volume of each fuel delivery. The cost counter **80** has five counter wheels **82–86** of increasing order rotatably mounted on a shaft **88** and the lowest order counter wheel **82** is connected (via gears **90**, **91**, a unidirectional spring drive clutch **92**, and a coupling **94**) to be rotated (in the clockwise direction as viewed in FIG. **3**) by the variator **42** in conjunction with the rotation of the lowest order counter wheel of the cost counter **16**. A U-shaped bail or yoke **96** is pivotally mounted on the counter shaft **88** and a transfer pinion shaft **100** is supported on the bail. Conventional mutilated transfer pinions **102** are mounted on the pinion shaft **100** for engagement with the counter wheels **82–86** for generating transfers between adjacent lower and higher order wheels in a conventional manner.

Each counter wheel **82–86** comprises a molded "0"–"9" type or print wheel **103**, a combined locking ring and transfer gear segment **104** integrally molded with the print wheel **103** and a separate **20**-tooth molded drive gear **106** (and for example are constructed as shown and described in U. S. Pat. No. 2,382,708 of Sterling Graydon, Jr. et al. dated Aug. 14, 1945 and entitled "Resettable Counter"). The print wheels **103** may be rotated in the adding direction (clockwise as viewed in FIG. **3**) relative to the respective drive gears **106** (for resetting the print wheels **103** to "0" while the transfer pinions **102** remain in engagement with the wheel drive gears **106** and combined locking ring and transfer gear segments **104**), and the counter shaft **88** has an axial slot **108** for receiving pivotal reset pawls **109** mounted on the print wheels **103** for resetting the type wheels in the adding direction to "0."

A serial printing counter **110** having three coaxial counter wheels **112–114** rotatably mounted on counter shaft **88** (and having an integral construction but otherwise like the counter wheels **82–86**) is provided for printing successive serial numbers on successive tickets **26**. Conventional mutilated transfer pinions **120** rotatably mounted on pinion shaft **100** are provided for indexing the wheels **113**, **114** in a conventional manner and a similar mutilated pinion **122** also rotatably mounted on shaft **100** engages the 20-tooth drive gear **124** of the lowest order counter wheel **112** for rotating the counter wheel **112** relative to the other counter wheels **113**, **114** as hereinafter described.

A date printer module **130** is mounted on the printer operating shaft **24** for printing the date on each ticket **26**. The

date printer module **130** comprises a support hub or sleeve **132** having 10 equiangularly spaced (i.e., spaced 36°) axial detent grooves **133** and three pairs of "0"–"9" print wheels **134** having individual ball detents **136** engageable with the detent grooves **133** of the support sleeve **132**. The print wheels **134** may be individually angularly set on the support sleeve **132** for printing the date with the month, day and year each designated by a pair of numerals in a conventional manner. An end washer **140** is affixed onto the inner end of the support sleeve **132** and has a depending tang **142** receivable within an axial slot **144** in the support shaft **24** for keying the date printer module **130** to the shaft. A collar **146** is rotatably mounted on the outer end of the sleeve **132** and is supported within a bushing **148** in the side plate **68**. The collar **146** provides a knob for axially withdrawing the date printer module **130** to a withdrawn position shown in part in broken lines in FIG. **2** (where the tang **142** engages a stop pin **152**) to provide access for manually setting the date print wheels **134**. Thus, the date printer may be easily set at the beginning of each day by merely withdrawing the date printer module **130** and manually setting the print wheels **134** as necessary. A diametrically extending detent spring **156** is mounted on the end of the collar **146** and the shaft **24** is provided with a detent annulus **158** for receiving the detent spring **156** for holding the date printer module **130** in its inner or operative position shown in full lines in FIG. **2**.

The printer operating shaft **24** is rotated in the clockwise direction as viewed in FIG. **3** and the counter shaft **88** is connected by gears **160–162** to be rotated by shaft **24** in the adding direction, clockwise as viewed in FIG. **3**. Shafts **162, 164** for backup or ink rolls **165, 166** respectively are connected by suitable gearing (not shown) to be rotated by shaft **24**, in the counterclockwise direction as viewed in FIG. **3**, and a pair of cam shafts **168, 169** are also connected by suitable gearing (not shown) to be rotated, by shaft **24**, in the clockwise direction as viewed in FIG. **3**. The shafts **24, 88, 162, 164, 168, 169** are connected by 1:1 gearing to be rotated through one revolution together for operating the printer.

A suitable paper roll (not shown) is provided, and as seen in FIG. **3** the paper **180** is fed from the roll between the coaxial cost and serial counters **80, 110** and corresponding backup roll **165** and between the date printer **130** and corresponding backup roll **166**. The backup rolls **165, 166** are made porous and impregnated with a suitable ink and have raised portions **182** such that when the shaft **24** is rotated one revolution the raised type on the date printer module **130** at station **184** and the raised type on the cost and serial counters **80, 110** at station **185** cooperate with the raised portions **182** on the rolls **165, 166** to provide a printout on the paper **180**.

Referring to FIGS. **5** and **6** a cam mechanism **200** operated by counter shaft **88** is provided for oscillating the transfer pinion shaft **100** during the rotation of the counter shaft **88**. The cam mechanism **200** provides for pivoting the transfer pinion shaft in the adding direction approximately 54° from its normal or withdrawn position shown in full lines in FIGS. **2–5** (during the first 48° of rotation of counter shaft **88**) for sequentially (a) readying the cost and serial counters **80, 110** for printing and (b) rotating the cost and serial counters **80, 110** as a unit with the counter shaft **88** to produce a printout. Upon rotation of the counter shaft **88** through a succeeding 312° to complete a revolution, the cam mechanism **200** pivots the pinion shaft **100** 54° back to its initial or normal operating position while counter wheels **82–86** are reset to "0" by counter shaft **88**.

During the 54° return movement of the pinion shaft **100**, a one-way locking pawl **202** (FIG. **3**) engages the 20-tooth drive gear **124** to hold the lowest order serial counter wheel **112** against return movement and to thereby index the counter wheel **112** 54° or 1½ counts (i.e., ½ count excess) in the adding direction relative to the remaining counter wheels **113, 114**. The drive pinion **122** which engages the lowest order wheel drive gear **124** rotates on the transfer pinion shaft **100** as the pinion shaft **100** returns to its normal or retracted position and a pivotal spring biased locking cam **204** which engages the alternate "long" teeth **206** of the drive pinion **122** is pivoted outwardly by the "long" teeth **206** as the drive pinion **122** rotates on the pinion shaft **100**. With the pinion shaft **100** in its normal or fully withdrawn position, a "long" tooth **206** of the drive pinion **122** is substantially perpendicular to locking cam **204** and upon the succeeding operation of the printer (and forward pivotal movement of the pinion shaft **100**) the drive pinion **122** is rotated by the locking cam **204** approximately 45° (until two "long" teeth **206** engage the locking cam **204** to lock the drive pinion **122** against further rotation) to in effect index the lowest order counter wheel one-half count — in the subtracting direction relative to the remaining serial counter wheels **113, 114** — to offset the prior ½ excess count.

Referring to FIG. **4**, a 10-tooth ratchet wheel **240** is keyed to the drive gear **106** of the lowest order cost wheel **82** and a ratchet pawl mechanism **242** is mounted on the pinion shaft **100** for engagement with the ratchet wheel **240**. The ratchet pawl mechanism comprises a support lever **244** rotatably mounted on pinion shaft **100** and biased by a spring **246** in the counterclockwise direction as viewed in FIG. **4** and a pawl **248** pivotally mounted on support lever **244**. With the pinion shaft **100** in its normal operating position shown in FIG. **4**, a tail **250** of support lever **244** engages a shaft **252** to pivot the lever **244** clockwise as viewed in FIG. **4** about the pinion shaft **100** to permit a leaf spring **256** to withdraw the pawl **248** substantially out of engagement with the ratchet wheel **240**. During approximately the first 10° of forward pivotal movement of the pinion shaft **100** the support lever **244** is pivoted by spring **246** to pivot pawl **248** into engagement with ratchet wheel **240** and if the wheel **82** were at an intermediate count position for example at the one-half count or beyond, to engage a ratchet tooth and index the counter wheel **82** to the next higher full count position. If the wheel **82** were at a lower intermediate count position the pawl **248** will engage the ratchet wheel **240** to rotate the wheel **82** with the remaining cost counter wheels **83–86** (as the pinion shaft **100** is pivoted forwardly) in which case the wheel **82** is in effect indexed to its next lower full count position.

The cam mechanism **200** comprises a cam plate **210** pivotally mounted on shaft **212** and having a slot for receiving the transfer pinion shaft **100**. The cam plate **210** has a central opening contoured to provide an inner cam edge **214** engageable by a roller **216** mounted on a collar **218** fixed onto the counter shaft **88**. The collar **218** provides an outer cam edge **220** and a stud or follower **222** is mounted on the cam plate **210** for engagement with the outer cam edge **220**. The inner and outer cam edges **214, 220** cooperate to pivot the pinion shaft **100** forwardly approximately 54°, in the clockwise direction as viewed in FIGS. **5** and **6**, from its normal or fully withdrawn angular position shown in FIG. **5** during the initial 48° of rotation of the shaft **88**, and then backwardly 54° to its normal operating position during the remaining 312° of rotation of shaft **88**.

After the counter shaft **88** is rotated approximately 4° from its normal operating position shown in FIG. **5** the cam follower **222** is released by the cam edge **220** to permit the pinion shaft **100** to be pivoted by spring **246** forwardly approximately 10° to its position shown in FIG. **6** for operating the ratchet pawl mechanism **242**. During the succeeding approximately 44° of rotation of counter shaft **88** the roller **216** engages the inner cam edge **214** to pivot pinion shaft **100** with the counter shaft **88** (and therefore rotate the cost and serial counters **80, 110** as a unit with the counter shaft **88**) during which unitary motion the type wheels of the cost and serial counters **80, 110** cooperate with the backup roll **165** to print the cost of the fuel delivery and the ticket serial number. During the remaining 312° of rotation the outer cam edge **220** engages the follower **222** to return the pinion shaft **100** to its fully withdrawn or normal position, and the counter shaft **88** resets the cost counter print wheels to "0." During the last 356° of rotation of the counter shaft **88** i.e., after the follower **222** has been

released to permit the pinion shaft **100** to rotate approximately 10°) the shaft **88** rotates approximately 366° (i.e., 6° more than a full revolution) relative to the pinion shaft **100** and therefore 366° relative to the counter print wheels thereby ensuring that the print wheels are fully reset to "0" with only 360° of rotation of the counter shaft **88**.

Referring to FIGS. **2** and **3** a shear mechanism **280** is provided for severing the printed ticket **26** from the paper roll. The shear mechanism **280** comprises a first fixed plate **282** and a second shear plate or guillotine **284** reciprocably mounted for cooperation with the fixed plate **282** for shearing the ticket from the paper roll. The shear plate **284** has an intermediate inclined shearing edge **288**, and a pair of laterally spaced tension springs **290** are connected to the lateral ends of the shear plate for actuating the shear plate **284** in one direction for shearing the paper. A latch lever **291** and an actuating lever **292** are pivotally mounted on the cam shafts **168**, **169** respectively and have lower ends received within slots in the shear plate **284** for controlling the motion of the shear plate. A tension spring **296** is provided for pivoting the lever **292** in the counterclockwise direction as viewed in FIG. **3** for actuating the shear plate **284** to a retracted position shown in part by broken lines in FIG. **3** for which purpose the tension spring **296** is sufficiently strong to overcome the bias of the drive springs **290**.

A control cam **300** is mounted on cam shaft **168** for controlling the pivotal operation of the drive lever **292**. The control cam **300** is contoured so as to release the actuating lever **292** after approximately the first 5° of rotation of cam shaft **168** (or printer operating shaft **24**) to retract the shear plate **284** and thereby permit the succeeding ticket to be fed downwardly between the plates **282**, **284**. The latch lever **291** provides for holding the shear plate **284** in its fully retracted position and a control cam **304** mounted on shaft **169** provides for maintaining the shear plate **284** latched in its retracted position until just prior to the completion of the full revolution of the printer operating shaft **24** at which point the shear plate **284** is released to shear the ticket **26** from the paper roll.

Referring to FIGS. **1** and **2**, the drive coupling **22** between intermediate shaft **20** and printer operating shaft **24** is designed to permit rotation of the printer operating shaft **24** in the correct angular direction only and to ensure proper angular alignment of the shafts **20**, **24**. For this purpose the drive coupling member **320** has a pair of diametrically related drive pins or teeth **322** at different radial distances from the axis of the shaft **22** and the gear **160** which functions as the driven coupling member has a pair of diametrically related pockets **328** at the same radial distances from the axis of the shaft **24** for receiving drive pins **322**. Also, the pin receptacles **328** and the drive pins **322** are tapered to provide for rotating the shaft **24** in one angular direction only, in the clockwise direction as viewed in FIG. **3**.

As will be apparent to persons skilled in the art, various modifications, adaptations and variations of the foregoing specific disclosure can be made without departing from the teachings of the present invention.

We claim:

1. A resettable roll printing counter comprising a counter shaft, a plurality of counter wheels of increasing order rotatable on the counter shaft, each counter wheel comprising a print wheel, a combined locking ring and transfer gear segment and a drive gear, the drive gears of at least all the higher order counter wheels being connected to the print wheels to permit rotation of the print wheels in at least one angular direction relative to the drive gears, the print wheels and shaft having cooperating means for resetting the print wheels by rotation of the shaft in said one angular direction, a transfer pinion shaft parallel to the counter shaft mounted for pivotal movement about the axis of the counter shaft, transfer pinions mounted on the pinion shaft intermediate the counter wheels for engagement with the combined locking ring and transfer gear segments and drive gears of the counter wheels for generating transfers between adjacent lower and higher order counter wheels, a rotary backup roll parallel to the counter shaft cooperable with the print wheels as they are rotated in said one angular direction for producing a printout, and operating means for pivoting the pinion shaft in said one angular direction from a first normal pivotal position thereof to an extended pivotal position for rotating the print wheels together in said one angular direction for producing a printout, for thereafter returning the pinion shaft to its normal pivotal position, and for rotating the counter shaft in said one angular direction for resetting the print wheels after the printout is produced.

2. A printing counter according to claim **1** wherein the operating means comprises means interconnecting the counter shaft and pinion shaft for pivoting the pinion shaft between its normal and extended positions as the counter shaft is rotated.

3. A printing counter according to claim **2** wherein the interconnecting means comprises cam means mounted on the counter shaft and a pivotal lever for pivoting the pinion shaft and having follower means engageable with said cam means.

4. A printing counter according to claim **2** wherein said cooperating means comprises detent means for resetting the print wheels by rotation of the counter shaft substantially one revolution in said one angular direction from an initial angular position thereof and wherein the interconnecting means is operable by rotation of the counter shaft from its initial angular position to pivot the pinion shaft from its normal pivotal position an angular amount greater than the corresponding angle of rotation of the counter shaft such that the counter shaft rotates through an angle greater than 360° relative to the pinion shaft as the counter shaft is rotated in said one angular direction through the remainder of said revolution.

5. A printing counter according to claim **1** further comprising a ratchet pawl mechanism for indexing the lowest order counter wheel relative to the remaining counter wheels to a full count position as the pinion shaft is pivoted in said one angular direction from its normal pivotal position.

6. A printing counter according to claim **5** wherein the ratchet pawl mechanism comprises a ratchet wheel connected to the lowest order counter wheel and a ratchet pawl mounted on the pinion shaft and engageable with the ratchet wheel for indexing the wheel as the pinion shaft is pivoted in said one angular direction from its normal pivotal position.

7. A printing counter according to claim **4** further comprising drive means for rotating the counter shaft substantially 360° in said one angular direction from its initial angular position, said drive means including a rotary drive coupling having an input coupling member with a pair of diametrically related axially extending drive teeth and a driven coupling member having diametrically related tooth abutments engageable by the drive teeth, the drive teeth and tooth abutments being at different radial distances from the axis of the coupling to ensure proper angular alignment of the drive and driven coupling members.

8. A serial printing counter comprising a counter shaft, a plurality of counter wheels of increasing order rotatable on the counter shaft, the counter wheels comprising a print wheel, a combined locking ring and transfer gear segment and a drive gear, a transfer pinion shaft parallel to the counter shaft mounted for pivotal movement about the axis of the counter shaft, transfer pinions mounted on the pinion shaft intermediate the counter wheels for engagement with combined locking ring and transfer gear segments and drive gears of the counter wheels for generating transfers between adjacent lower and higher order counter wheels, a rotary backup roll parallel to the counter shaft cooperable with the print wheels as they are rotated in one angular direction for producing a printout, operating means for pivoting the pinion shaft in said one angular direction from a first normal pivotal position thereof to an extended pivotal position for rotating the print wheels together for producing a printout and for returning the pinion shaft to its normal pivotal position, a drive pinion mounted on the pinion shaft for engagement with the drive

gear of the lowest order counter wheel for rotating the wheel in said one angular direction with the pinion shaft, an arcuate locking ring engageable with the drive pinion for locking the pinion against rotation as the pinion shaft is pivoted in said one angular direction, and a one-way locking pawl engageable with the drive gear of the lowest order counter wheel for indexing the wheel relative to the remaining counter wheels as the pinion shaft is returned to its normal pivotal position.

* * * * *