

Nov. 29, 1938.

C. J. W. WILLERS

2,138,287

REGISTER WITH PRESET PRINTING MECHANISM

Filed March 19, 1937

5 Sheets-Sheet 1

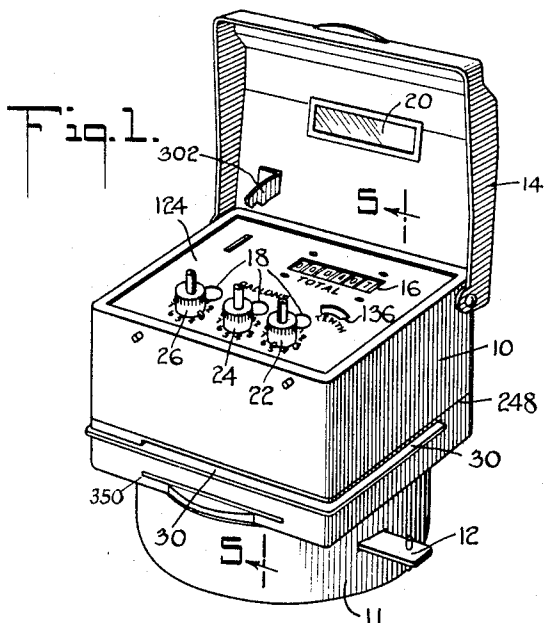


Fig. 2.

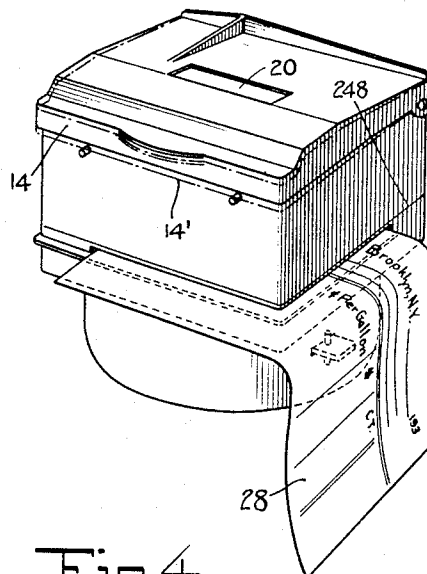


Fig. 3.

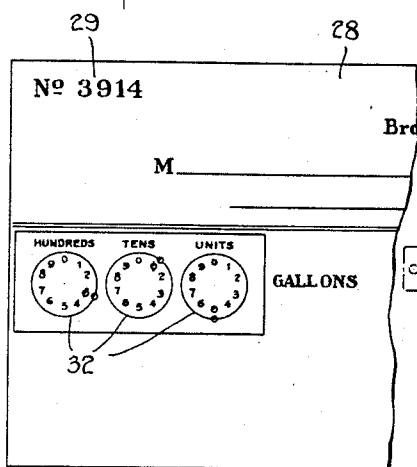
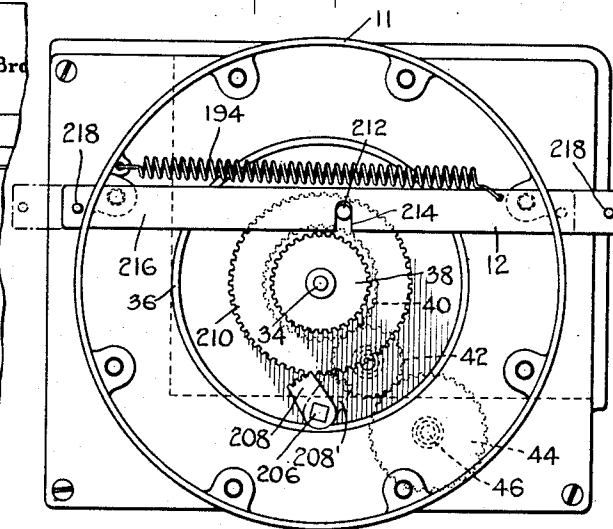


Fig. 4.



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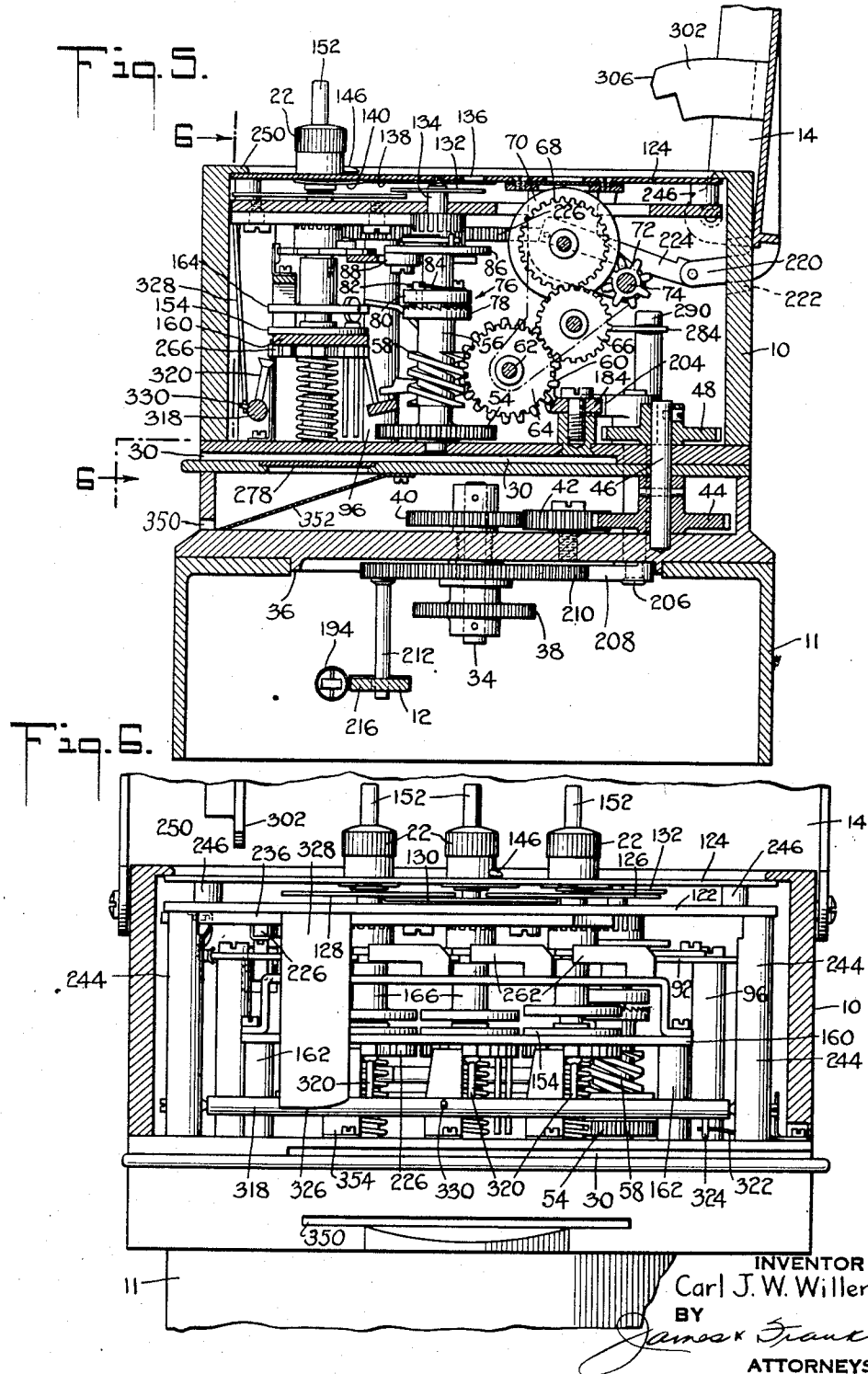
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REGISTER WITH PRESET PRINTING MECHANISM

Filed March 19, 1937

5 Sheets-Sheet 2



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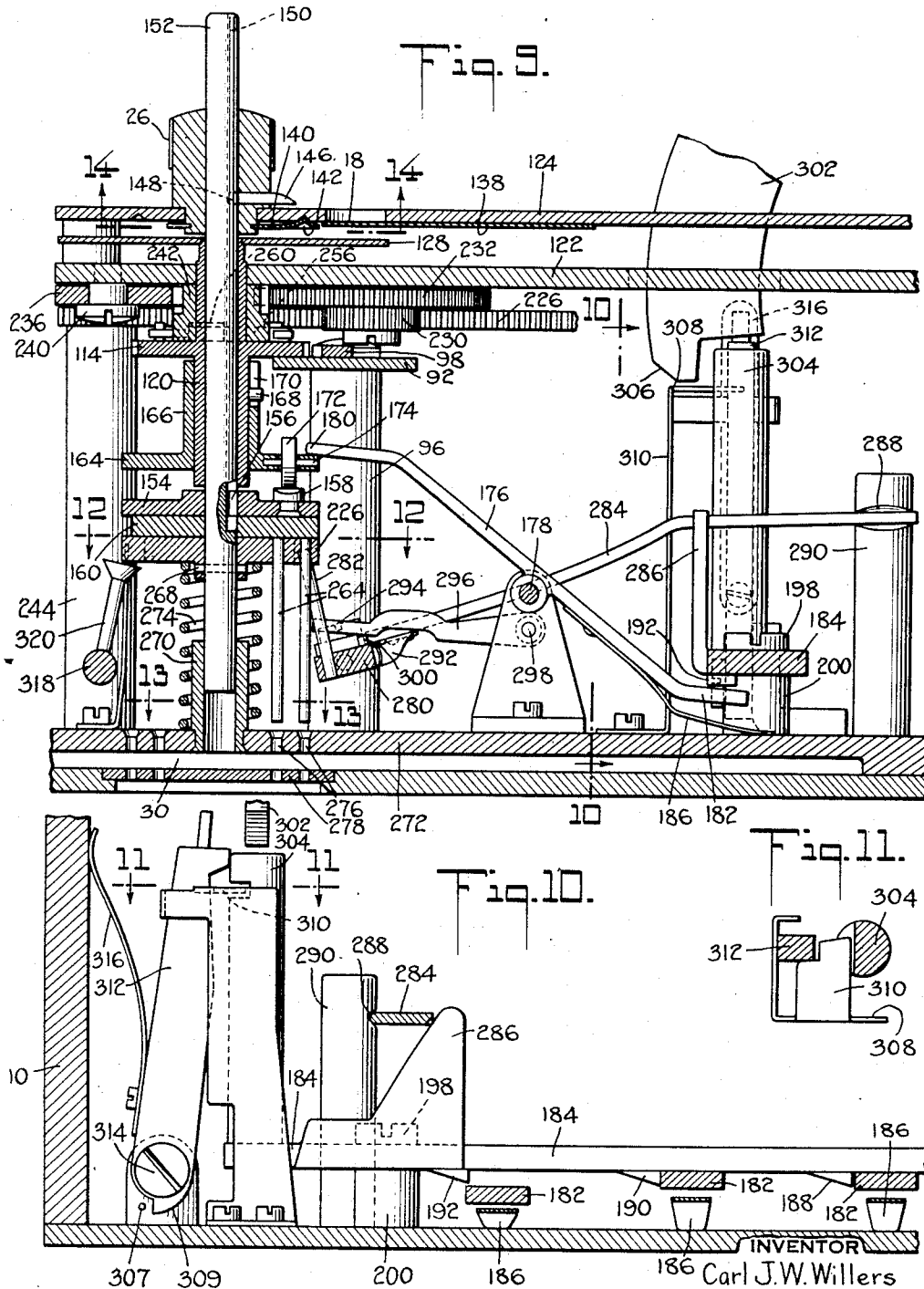
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REGISTER WITH PRESET PRINTING MECHANISM

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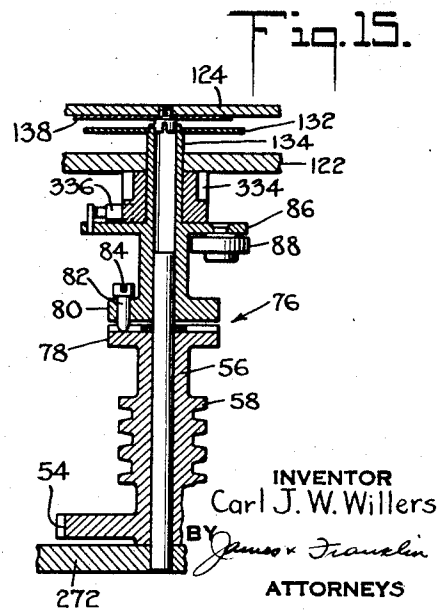
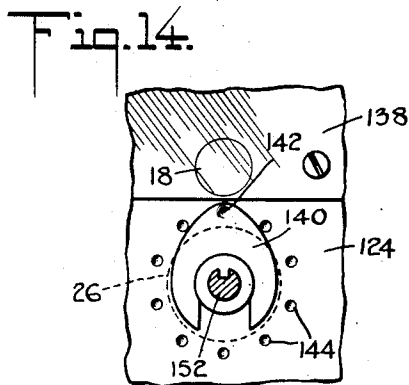
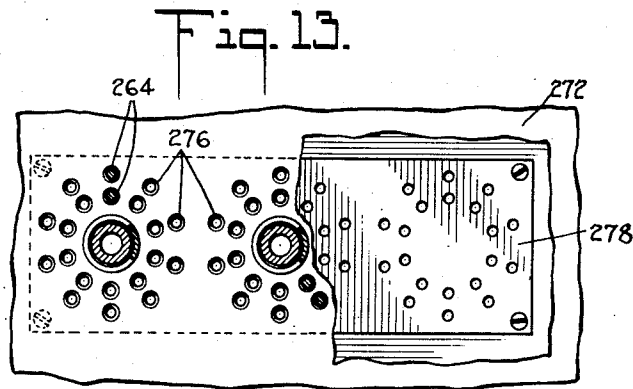
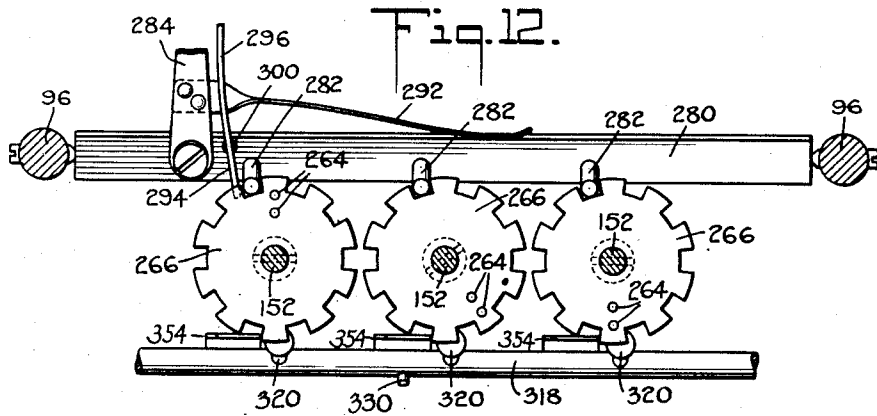
C. J. W. WILLERS

2,138,287

REGISTER WITH PRESET PRINTING MECHANISM

Filed March 19, 1937

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UNITED STATES PATENT OFFICE

2,138,287

REGISTER WITH PRESET PRINTING
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Application March 19, 1937, Serial No. 131,776

25 Claims. (Cl. 234—2)

This invention relates to registers, and more particularly to a printing register combined with valve tripping mechanism.

The primary object of the invention is to generally improve printing registers. A more particular object is to make it unnecessary for the counter wheels of the register to turn the print wheels, for the latter should be strong and heavy, particularly where they are to print by perforation, and it would be an undesirably excessive load on the meter if the counter wheels were forced to turn the print wheels.

Still another object is to greatly simplify the mechanism of the printing register, and to this end the print wheels are turned in advance or manually set to the desired delivery. The register includes valve tripping mechanism so intimately and dependently related to the printing mechanism that the valve is tripped and the delivery stopped when the delivery equals the preset print value.

In accordance with further features and objects of my invention, the register mechanism is enclosed in a case provided with a hinged cover, and the cover is itself used as a manually operable means to cause the printing mechanism to function. The cover is also used to obtain restoration of the run or delivery counter to zero. Between deliveries, the cover may be closed. When preparing for delivery, the cover is opened, thus exposing the knobs which preset the print wheels, and these knobs are turned to the desired delivery. At the end of the delivery, the valve is automatically shut, and a suitable sales slip or voucher is inserted in a receptive printing station, whereupon the cover of the register is closed. The closing of the cover causes printing or perforation of the voucher.

In accordance with still another object of my invention, the register is provided with appropriate locking or safety features. A cover lock is provided which prevents repeated printing of vouchers, it being possible to print once only for each run or operation of the valve tripping mechanism. Another lock which may for convenience be termed a "preset" lock is included in the mechanism and prevents change of the setting of the print wheels once delivery is begun and until the delivery and the printing operation have been completed. In the particular form of the invention here illustrated in which the print wheels are operated by exposed depressor rods, I further provide a depressor lock which prevents functioning or depression of the

print wheels until after the delivery is completed and the valve is shut.

To the accomplishment of the foregoing and other objects which will hereinafter appear, my invention consists in the printing register elements and their relation one to the other, as hereinafter are more particularly described in the specification and sought to be defined in the claims. The specification is accompanied by drawings in which:

Fig. 1 shows in perspective a register embodying features of my invention, with the cover in open position;

Fig. 2 is a similar view of the register, showing the cover closed to print a sales slip or voucher;

Fig. 3 shows a portion of the voucher;

Fig. 4 is an inverted plan view of the register;

Fig. 5 is a section taken in elevation through the register looking in the direction of the arrows 5—5 in Fig. 1;

Fig. 6 is a front view of the register mechanism as it would be seen by cutting away the front wall of the case, as indicated by the line 6—6 in Fig. 5;

Fig. 7 shows the register mechanism in plan with the inside cover plate removed;

Fig. 8 shows the register mechanism in plan with the inside cover plate and the top frame plate removed;

Fig. 9 is an enlarged transverse section taken in the plane of the line 9—9 of Fig. 8;

Fig. 10 is a section showing the valve trip bar and the cover lock mechanism, and is taken in the plane of the line 10—10 of Fig. 9;

Fig. 11 is a section through the cover lock mechanism taken in the plane of the line 11—11 of Fig. 10;

Fig. 12 is explanatory of the preset lock and depressor lock, and shows the same in plan at the line 12—12 of Fig. 9;

Fig. 13 is explanatory of the punch or perforating printing mechanism, and is taken in the plane of the line 13—13 of Fig. 9;

Fig. 14 is an inverted plan view of a spring detent associated with each manually adjustable knob, and is taken in the plane of the line 14—14 of Fig. 9; and

Fig. 15 is a section through a vertical drive shaft for the counters of the register, this section being taken in the plane of the line 15—15 of Fig. 7.

Referring to the drawings, and more particularly to Figs. 1 and 2, the register is housed in a casing 10 adapted to be mounted directly over a conventional fluid meter, as by means of the

circular neck 11. A valve extension 12 is connected directly to a suitable shut-off valve which controls the flow of liquid, for example fuel oil, through the meter. The casing 10 is provided with a hinged cover 14. There is a totalizing counter, the reading of which is exposed at a window 16, and a delivery or run counter the reading of which is exposed through openings 18. The reading of the run counter may also be seen when the cover 14 is closed, and a window 20 is provided for this purpose. When the cover is open, as shown in Fig. 1, a series of manually adjustable knobs or thumb wheels 22, 24 and 26 are exposed for manipulation. After inquiring the desired quantity of oil to be delivered, the driver opens cover 14, turns knobs 22, 24 and 26 to the desired delivery, and thereupon opens the valve connected to valve extension 12. The liquid then flows until the desired delivery has been reached, whereupon an appropriate trip mechanism within register casing 10 functions and closes the valve through valve extension 12. The driver then inserts a suitable sales slip or voucher 28 (Figs. 2 and 3) into a receptive printing station 30, and closes the cover 14, pressing the same downwardly to the broken line position 14' shown in Fig. 2. The voucher 28 is perforated as shown in Fig. 3, the perforating operation being simplified by printing the voucher 28 in advance with numbered dials 32 so that only a few perforations are needed. When pressure on cover 14 is released, it moves upwardly slightly through the solid line position shown in Fig. 2, and the voucher 28 is removed from the register. Ordinarily, the voucher will be inserted and perforated, in duplicate, one copy being handed to the customer, and the other being kept by the driver.

The main parts of the register mechanism are hereinafter described in detail.

The counter mechanism

Referring to Figs. 4 and 5, the drive from the meter is applied to a vertical spindle 34 concentric with the circular neck or flange 11. This concentricity is desirable in order to make it possible to face the valve extension 12 in any direction relative to the meter. Similarly, the register head is adjustably related to the neck 11 as by the use of a concentric circular flange 36, this relation making it possible to face the register head in any desired direction relative to the valve extension and the meter. The drive from the meter may be applied to a pinion (not shown) which in turn meshes with a gear 38 mounted on the lower end of central shaft 34.

At its upper end shaft 34 carries a gear 40 (Figs. 4 and 5) which meshes with an idle gear 42, which in turn meshes with a gear 44 mounted on an upright spindle 46 which passes upwardly into the register casing 10 at a point outside the printing station 30. At its upper end spindle 46 carries a gear 48 which, as is best shown in Fig. 8, meshes with gear 50 which in turn meshes with gear 52 which in turn drives gear 54. Referring now to Fig. 5, it will be seen that gear 54 is mounted on the lower end of an upright worm shaft 56 provided with a worm 58 meshing with a worm gear 60 (Figs. 5 and 7), which through shaft 62 drives a spur gear 64 meshing with an idle gear 66 which in turn drives a gear 68 connected directly to the first digit wheel 70 of the totalizing counter. The entire series of number wheels is provided with conventional transfer mechanism of the Geneva pinion type, the pinions 72 being freely rotatable

on a support shaft 74. It may be explained that the reason the gear trains 40, 42, 44 and 48, 50, 52, 54, are used is merely to displace the shaft 46 sidewardly so that the printing station 30 may be large in area.

The run or delivery counter is also driven from worm shaft 56. The drive is through a unidirectional clutch so that there will be no interference with the totalizing counter and the meter when the delivery counter is reset to zero at the end of each run. To this end shaft 56 is provided at its upper end with a unidirectional drive clutch 76 (Figs. 5 and 15). The driving part of the clutch consists of a radially serrated disc 78, while the driven part includes a disc 80 carrying a dog 82 normally pressed downwardly by a spring 84. Driven clutch disc 80 in turn drives a cam disc 86, the latter carrying a roller 88. Referring now to Fig. 8 of the drawings, roller 88 rides within cam follower arms 90, the latter being formed integrally on a reciprocally mounted dog plate 92. Plate 92 is slidably supported by appropriately shouldered screws 94 tightened into the upper ends of support posts. Dog plate 92 carries a single elongated dog 98 pivotally mounted at 100 and normally urged forwardly by a leaf spring 102. Dog 98 is provided with three dog teeth 104, 106, and 108, respectively adapted for cooperation with ratchet wheels 110, 112 and 114.

Ratchet wheel 110 has an extra deep tooth 116 and it is only when dog 104 moves into tooth 116, that the next dog 106 is moved against the next ratchet wheel 112, thus making dog 106 function for one step each time ratchet wheel 110 is moved through a full revolution. Ratchet wheel 112 arrests dog 106 and so prevents the third dog 108 from reaching the third ratchet wheel 114. However, ratchet wheel 112 is also provided with a single deep tooth 118, and when this tooth reaches dog 106, then dog 108 engages ratchet wheel 114 for one step. It will thus be seen that as the worm shaft rotates, the dog plate 92 and with it the multiple dog 98 reciprocate, and thus move the ratchet wheels step by step.

The ratchet wheels are secured to or formed integrally with tubular shafts 120 best shown in Fig. 9. These shafts pass through the top frame plate 122, but terminate beneath the inside cover plate 124. At its upper end each tubular shaft 120 carries a number disc and these discs are preferably placed in overlapping relation for the sake of compactness, that is, to bring the shafts closer together, as is best indicated in Fig. 7, in which it will be seen that the units disc 126 and the hundreds disc 128 overlie the tens disc 130. Figs. 1 and 9 illustrate how the openings or small windows 18 are located to expose only the uppermost numeral on the number discs. Thus, in Fig. 7 the reading is 45 gallons. The discs are force-fitted over the upper ends of the tubular shafts, the latter being shouldered to limit the insertion of the shaft in the disc. It will be understood that in practice the parts are preferably keyed together (not shown) or otherwise mechanically interlocked to prevent relative rotation of the disc and shaft.

For calibration and test purposes, the counter may be provided with a tenths wheel, and referring to Figs. 7 and 15, it will be noted that tenths wheel 132 is fixedly secured at the upper end of a shaft 134 which projects upwardly from and may be formed integrally with the camming disc 86 and the driven clutch disc 80.

Inasmuch as the units disc 126 is moved one digit for each complete rotation of the camming disc 86, it follows that the tenths disc 132 turns in ten-to-one ratio, and therefore indicates tenths.

5 Tenths wheel 132, like the other number wheels, is disposed between the top frame plate 122 and the inside cover plate 124. The reading of the tenths wheel may be seen through a window 136 best shown in Figs. 1 and 5. The windows 18 and 136 are closed against dirt by a suitable transparent plate 138, said plate being made of Celluloid or more preferably glass, and being disposed immediately beneath the inside cover plate 124, as will be seen from inspection of
10 Figs. 5, 9, 14 and 15.

The presettable trip mechanism

Both the printing mechanism and the trip mechanism are presettable, and inasmuch as they are simultaneously adjusted by the same thumb knobs, it follows that the latter may be described as part of either the trip mechanism or the printing mechanism. Because the valve is tripped before the voucher is printed, I shall first describe the trip mechanism.

Referring to Figs. 5, 9 and 14, each of the thumb knots 22, 24 and 26 is journaled in the inside cover plate 124. Beneath the plate 124 the knob is provided with a spring detent arm 140 the center portion of which is permanently locked to the lower end of the neck of the knob, and the outer end of which is struck upwardly to form a dot or teat 142. The underside of plate 124 is indented with a series of ten indentations 144 for cooperation with dot 142. With this construction the knob is readily turned to any of ten positions, and is held securely in place. The knob is provided with an outwardly projecting pointer 146, and this cooperates with a series of ten numbers engraved on the upper surface of plate 124 about each knob, as is clearly indicated in Fig. 1.

The knob is also provided with an internally projecting key 148. This key may be the inner end of a single pin the outer end of which is sharpened to form the pointer 146 previously referred to. Key 148 fits into a spline or keyway 150 on an axially reciprocable printing wheel depressor rod 152, the said rod passing through the knob, as is clearly shown in Fig. 9. Depressor rod 152 also passes through the tubular shaft 120 of counter disc 128. Below the lower end of tubular shaft 120 the depressor rod 152 carries a disc 154 keyed to the rod 152. Disc 154 carries on its upper surface a camming bump or lift 158, the said lift being located at a position corresponding to the pointer 146 on the knob. Disc 154 rests directly on and is supported by a suitable bearing plate 160, said plate being mounted on the upper ends of support posts 162, as is best shown in Fig. 6.

Concentrically mounted above cam disc 154 is a cam follower disc 164. This disc is formed with a sleeve 166 which surrounds tubular shaft 120 and is axially reciprocable therealong. The sleeve is rotated with the disc, however, by reason of a pin 168 received in a slot 170. Disc 164 carries a cam follower wheel 172 rotatably mounted thereon by means of a pin 174. When the tubular shaft 120 and the counter disc turn to a number corresponding to the setting of the thumb knob, the cam follower wheel 172 rides up on the cam lift 158, thus elevating the entire disc 164. All three discs 164 are elevated when

the run counter reading equals the preset or desired delivery.

Associated with each cam follower disc 164 is a detent lever 176, said lever being pivoted on a rod 178 and having its forward end 180 resting over disc 164. The rear end 182 of lever 176 extends beneath a reciprocable trip bar 184, said trip bar being best shown in Figs. 8, 9 and 10. The ends 182 of levers 176 are normally urged upwardly by leaf springs 186. The trip bar 184 carries three stops 188, 190 and 192 on its under side. The trip bar 184 is normally urged to the right, as viewed in Figs. 8 and 10, either by the valve spring or, as here illustrated, by a spring 191 (Fig. 4) through linkage subsequently described, but at the beginning of the run the trip bar is prevented from moving by one or more of the detent levers 176. At the end of the run when the camming discs 164 rise, the detent levers 176 are moved downwardly out of the way of stops 188, 190 and 192, and the trip bar is consequently released. In passing, it may be noted that the spacing of stops 188, 190 and 192 is not made exactly equal to the spacing of the detent levers, but instead is altered slightly to provide a slight clearance, say $\frac{1}{1000}$ ths of an inch, so that the detent levers may move freely up and down while waiting for the detent lever of higher order to be released. Specifically, in Fig. 10, it will be seen that there is a slight clearance between the stop 188 and the "units" detent lever. Consequently, the latter may move freely up and down while waiting for the stop 190 to be released from the "tens" detent lever. In Fig. 10 the "hundreds" detent lever has already released stop 192, but it will be seen that if stop 192 were bearing against the "hundreds" detent lever, there would be clearance for the "units" and "tens" detent levers.

Trip bar 184 is slotted at 196 (Fig. 8) and is slidably supported by screws 198 received in the upper ends of blocks or posts 200. The connection between the trip bar 184 and the valve extension 12 is made as follows: Referring to Fig. 8, trip bar 184 is recessed at 202 to receive the forward end 204 of an arm, the rear end of which is secured to a spindle 206. Referring now to Figs. 4 and 5, the lower end of spindle 206 carries a toothed arm or gear sector 208, the teeth of which are adapted to mesh with a gear 210 which is concentric with but freely rotatable about the central shaft 34. Gear 210 carries a depending pin 212 the lower end of which rides in a slot 214 in the valve extension 216. The latter passes through and is carried by the circular wall or flange 11. It is normally urged to the left as viewed in Fig. 4, by the pull spring 194 previously referred to. The motion of valve extension 216 may be limited by pins 218. It will be evident from inspection of Fig. 4 that valve extension 216 is attempting to move to the left under the influence of spring 194, but is prevented from movement by the toothed arm 208 which in turn is held by the trip bar within the register mechanism. As soon as the trip bar is released by the detent levers, the valve extension 216 moves sharply to the left, as shown in Fig. 4, the toothed arm 208 meanwhile moving in a clockwise direction to the broken line position 208'. It is evident that a lever might be used in place of the complete large-diameter gear 210, but the advantage of the complete gear is that the parts of the mechanism may be faced in any direction desired, as was previously explained in

connection with the description of the counter mechanism.

The counter restoring mechanism

5 When the cover 14 of the register case is opened, the delivery or run counter is restored to zero reading. This is accomplished by mechanism which will be described with reference to Figs. 5, 7 and 8 of the drawings.

10 The cover 14 carries projecting from its rear edge an arm 220 movable through a slot 222 in the rear wall of the case. Arm 220 is connected through a link 224 to a rack 226. Rack 226 is reciprocally mounted just beneath top frame plate 122 by means of suitable bearing blocks 228. Rack 226 meshes with a pinion 230 fixed to a gear 232 which in turn meshes with a pinion 234 geared to a rack 236, the latter being reciprocally mounted beneath top frame plate 122. Rack 236 is longitudinally slotted at 238 and slidably supported by appropriate shouldered screws 240, as is best shown in Figs. 7 and 9. The rack meshes with a series of restoring pinions 242, the restoring pinions being freely rotatable about tubular shafts 120, as is best shown in Fig. 9.

25 The pinions are distinctly shown in plan in Fig. 8, this figure showing the appearance of the mechanism after removing the top frame plate 122.

30 To digress for a moment, one of the advantages of the present register is the ease of assembly, for the parts are associated into convenient sub-structures. For example, the outside casing 10 may be removed by lifting the same upwardly from the register mechanism, the parts separating on the line 248 in Figs. 1 and 2. This, of course, removes the flange 250 (Figs. 5 and 6) which otherwise overlies the inside cover plate 124. The thumb knobs 22, 24 and 26 are mounted wholly upon the inside cover plate 124, the latter being secured above frame plate 122 and spaced therefrom by appropriate spacers 246. By removing screws passing through spacers 246 (said screws being received in holes 252 in Fig. 7), the inside cover plate 124 may be 45 bodily removed, the thumb knobs sliding upwardly with plate 124 about the depressor rods 152. The mechanism then appears as shown in Fig. 7, except that the totalizing counter is also removed with the plate 124.

50 By preliminarily removing the number discs and then removing the screws 254, the top frame plate 122 may be bodily removed. Screws 254 pass through the frame plate into the upper ends of support columns or posts 244 (Fig. 6). The entire rack mechanism including the rack 226, the rack 236 and the step-up gear train therebetween, is carried on frame plate 122 and is removed when the frame plate is raised. The register mechanism is then exposed, as shown in 60 Fig. 8.

Returning now to the details of the zero-izing mechanism, each of the ratchet wheels 110, 112 and 114 carries a pawl 256 resiliently urged toward pinion 242 by a spring 258. Below the teeth of pinions 242 I provide a single notch or tooth 260 for cooperation with the pawl 256. The pawl is so faced that the normal clockwise movement of the ratchet wheels and number discs is in no way impeded. During closing of 70 the cover 14 of the register, the rack 226 is drawn rearwardly, thus moving rack 236 toward the right, which turns pinions 242 counterclockwise. Here again the pawls are ineffective and the ratchet wheels are additionally prevented from moving by spring holding dogs 262.

However, when the cover is opened, the rack 226 is moved forwardly, the rack 236 is moved to the left, the pinions 242 are turned clockwise, and the pawls 256 are caught and turned clockwise for that portion of a revolution needed to restore 5 the number discs to zero. It will be understood, of course, that the range of movement produced by the cover and the gear ratio in the rack mechanism is such as to produce a single revolution of the restoring pinions 242.

10 Restoring means is also provided for the tenths wheel 132. Referring to Fig. 7, it will be seen that rack 236 includes at its end a parallel rack 332 the teeth of which mesh with the restoring pinion 334. This pinion is shown in greater 15 detail in Fig. 15, and it will be seen that the pinion is freely rotatable about tubular shaft 134 except for the effect of a restoring pawl 336 mounted on camming disc 86 (Fig. 8) and functioning like the restoring pawls previously de- 20 scribed.

The printing mechanism

The printing mechanism functions whenever the cover is pushed down at the end of a run or delivery. The paper perforating punches are 25 carried at the lower ends of the depressor rods 152, previously referred to, and when the cover is closed, it bears directly on top of and depresses the depressor rods, which in turn move the punches through an appropriate punch 30 plate.

Referring to Figs. 9, 12 and 13, the punches 264 are mounted at their upper ends in a disc 266 the periphery of which is toothed for certain lock purposes subsequently described, and which 35 may therefore be referred to as a "lock" disc. Disc 266 is fixedly mounted on depressor rod 152, the parts being keyed together if desired by a pin 268. The lower end of depressor rod may be carried in a tubular bearing 270 fixedly 40 mounted on the bottom frame plate 272. A compression spring 274 is disposed between the bottom frame plate 272 and the lock disc 266 and normally urges the lock disc upwardly to the position shown in Fig. 9. When the thumb 45 knob is turned to a desired preset number, the punches 264 are turned by rod 152 to a position corresponding to the selected number. It follows that from the outset, the printing mechanism is manually set to the ultimately printed 50 reading. There is no need for the comparatively delicate counter mechanism to move the preferably sturdy printing mechanism.

When rod 152 is depressed, the lock disc 266 and with it the punches 264, are also depressed. 55 During the first part of their movement the punches 264 enter into appropriate funnel-shaped guide openings 276 in the bottom frame plate 272. When the cover is pushed all the way down, the punches 264 continue to and pass 60 through the female punch plate 278. Inasmuch as the voucher being printed rests between frame plate 272 and the punch plate 278, the paper is perforated by the punches. The punch plate 278 is preferably a hardened steel plate or insert, as 65 is best shown in Fig. 13.

It will be understood that it is not necessary to perforate the voucher, and ordinary ink printing mechanism may be employed. It will also be understood that even with the arrangement 70 here shown, only one punch is essential, but I prefer to use a pair of punches in order to better indicate the radial position of the printing wheel. This radial position may be indicated by more than two punches, or by a single punch of 75

elongated rather than circular section. The reading is clear from the radial position of the punch marks, and is still further clarified by preliminarily printing the sales slip or voucher with completely numbered dials, as is shown in Fig. 3, these dials being matched in spacing and location to the perforating mechanism of the register. The term "print" in the claims is generic to either perforation or surface printing, and "print wheel" includes a punch wheel.

Referring to Fig. 2, it will be seen that after the cover has been pushed downwardly to the broken line position 14', it springs upwardly somewhat by itself to the solid line position 14, this upward movement being caused by the reaction of the compressions springs 274 on the depressor rods 152. The vouchers are thereby cleared of the punches and are readily removable.

Interlock or safety features

In order to prevent fraudulent misuse of or tampering with the mechanism, the register is provided with a number of locking or safety features. One such lock is intended to prevent the preset or print reading from being changed until after the delivery and printing operations have been completed. This lock may for convenience be called a "preset" lock, and will be described with reference to Figs. 9, 10 and 12 of the drawings.

Between posts 96, I pivot a lock bar 280 from which three lock pins 282 project upwardly. The upper ends of these lock pins are adapted to move into the teeth or recesses in the lock discs 266. Lock bar 280 carries a cam follower arm 284 which extends rearwardly therefrom and which cooperates with a reciprocable cam 286, said cam being mounted on the trip bar 184. When the delivery valve is opened at the beginning of a run, the trip bar 184 is moved to the left, and consequently, the cam 286 bears against arm 284 and lifts the same to the position shown in Figs. 9 and 10. This rocks the lock bar 280 and moves the upper ends of lock pins 282 into locking engagement with the print wheels or lock discs 266, thus preventing any change in the preset print reading. This condition is maintained throughout the delivery. When the delivery has been completed, trip bar 184 is released and moves to the right, thus moving cam 286 away from the cam follower arm 284. However, the arm is not yet freed, and instead is held in position by a detent notch 288 formed on a post 290 (Figs. 9 and 10). Arm 284 is urged into notch 288 by a leaf spring 292 (Fig. 12). Inasmuch as any attempt to change the reading of the print wheels or lock discs will cause a pressure on pins 282 which either reacts on posts 96, or if there be any additional force component, tends to intensify the locking engagement, it is unnecessary for detent notch 288 to provide more than a slight restraint on cam follower arm 284.

Very near the end of the printing operation and after the voucher has been perforated by the punches, the "hundreds" print wheel (lock disc 266) reaches and bears against the forward end 294 of an arm 296 the rear end of which is pivotally mounted at 298 (Fig. 9). The depression of arm 296 at the end of the printing operation dislodges cam follower arm 284 from restraining detent 288, this being caused by direct downward pressure exerted by an arm 296 on a pin 300 mounted on trip bar 280 near the rear edge thereof. The print mechanism is thereby freed for manual adjustment to a new reading. Of course,

at this time the cover of the register is closed, for it is the closing of the cover that performs the perforating operation. However, when the cover is raised for the next delivery, the thumb knobs will be found freed for perforating adjustments. Only when the delivery valve is opened, is the preset lock again moved to the locking position shown in Figs. 9 and 12.

A second safety feature is intended to prevent the repeated printing of vouchers after a single delivery. For this purpose I provide a cover lock which prevents operation of the cover more than once for any single delivery. The cover lock will be described with reference to Figs. 1, 8, 9, 10 and 11.

In Fig. 1 attention is directed to the arcuate arm 302 the upper end of which is rigidly secured to cover 14, and the lower end of which passes through a mating slot in the inside cover plate 124. The location of the stop arm 302 is further indicated in Figs. 5 and 6. Referring now to Figs. 9 and 10, I direct attention to the post or abutment 304 which is disposed directly beneath the inner end of cover arm 302 and which is carried on and moves with the trip bar 184. With the trip bar in the position shown in Figs. 9 and 10, it is manifest that the cover can not be closed, for the lower end of arm 302 bears directly on the upper end of post 304. For this reason the cover can not be closed during delivery and before the valve has been shut. At the end of the delivery, trip bar 184 is moved to the right as viewed in Fig. 10, thus moving the post 304 out of the path of arm 302. The cover may then be fully closed and the printing operation thereby completed. During closing of the cover, the camming forward edge 306 of arm 302 bears against the edge 308 (Fig. 11) of a resilient stop 310, thus moving the same forwardly out of the way of a latch 312 pivoted at its lower end 314 (Fig. 10). Latch 312 is urged inwardly against the side of arcuate arm 302 by a leaf spring 316 reacting against the side wall 10 of the casing. While the cover is fully closed, the latch 312 bears against the side of arm 302, and when the cover is opened, the latch springs under arm 302, until limited by stop 307, 309. This prevents complete closing of the cover.

When the delivery valve is opened for a new delivery, the trip bar 184 is moved to the left, as viewed in Fig. 10, and the stop post 304 moves latch 312 away from one arm 302, as shown in the drawings, but, of course, at this time the stop post itself prevents full closing of the cover. This prevents printing until a new delivery is begun and completed. At that time the cover can be fully closed because the stop post 304 moves to the right with trip bar 184, but latch 312 is prevented from moving along with stop post 304 by the resilient stop 310. Repeated printing of vouchers is prevented because as soon as the cover is elevated slightly, it cannot be fully depressed to print another, unless the cover lock is first cleared by a delivery. As a further precaution, the vouchers may be serially numbered, as indicated at 29 in Fig. 3.

In the particular structure here disclosed, the printing mechanism has been greatly simplified by the use of simple, straight depressor rods which project upwardly through the thumb knobs, and which are depressed by the inside wall of the cover. This simplification, however, introduces the disadvantage of the possibility of depressing the rods manually without closing the cover. In accordance with a further feature of my invention, I provide means to pre-

vent depression of the rods by means other than the cover, and for this purpose, I include in the mechanism a lock which may for convenience be termed a "depressor" lock. Referring to Figs. 5, 6, 8, 9 and 12 of the drawings, the depressor lock comprises a lock bar 318 pivotally mounted between the front posts 244. Lock bar 318 has projecting upwardly therefrom, a plurality of stop pins 320, there being one pin for each print wheel. The pins are normally turned rearwardly to the position shown in the drawings by means of a leaf spring 322 (Figs. 6 and 8) which bears against the rear end of an arm 324 projecting rearwardly from lock bar 318. The downward pressure of spring 322 oscillates the upper ends of stop pins 320 rearwardly and brings the same beneath the print wheels or lock discs 266. This effectually prevents depression of the lock discs and therefore prevents functioning of the printing mechanism.

To release the depressor lock I provide a camming surface 326 (Fig. 6) at the lower end of a plate 328 the upper end of which is secured to the restoring rack 236 previously referred to. Lock bar 318 has projecting outwardly therefrom a cam follower pin 330, the said pin being so situated that the cam surface 326 hides over the same only after the rack 236 has moved sidewardly an amount corresponding to nearly complete closing of the cover. Cam 326 bearing on cam follower 330 oscillates the lock arm 318 and moves the stop pins 320 forwardly out of the path of the discs 266. The discs may therefore be moved downwardly by the cover. When the cover is opened for the next delivery, the rack 236 is moved sidewardly to the left, thus freeing the depressor lock until the cover has again nearly completely closed.

Operation

Ordinarily, between deliveries and during travel of the tank truck, for example, the cover 14 of the register head is closed. When the truck arrives at a customer's home, the desired delivery is ascertained and the cover is raised. During raising of the cover the dials of the delivery counter are restored to zero. The preset knobs are turned to the desired reading and the delivery valve of the hose line is opened. During opening of the valve, the valve extension 12 and the trip bar 184 are moved. The cover is thereby locked in open position and can not be closed because stop post 304 moves beneath the stop arm 302 of the cover. While the trip bar is moved, the cam 286 thereon elevates cam follower arm 284 and therefore moves the preset lock to locked position, and from this time forward it is impossible to change the reading of the preset knobs. As the delivery proceeds, the flow meter drives the register and increases the reading of the totalizer, and also the reading of the run counter until the latter finally equals the preset reading. At this time the cam follower discs 164 are elevated, and detent levers 176 are oscillated, thus releasing the trip bar and the valve extension with consequent instantaneous shutting of the valve. It is still impossible to change the preset reading because the preset lock is detained in locked position by the notched detent post 290, which holds cam follower arm 284 in elevated position. A sales slip or voucher is now inserted fully into the printing station and the cover of the register is closed. As the cover closes, and when it nearly reaches the de-

pressor rods, the depressor lock is released and the cover is therefore free to push the perforating punches downwardly. At the end of the perforating or printing operation, the preset lock is released, thus freeing the preset knobs for future operation when the cover is again raised for another delivery. The cover springs upwardly somewhat from its lowermost position, thus stripping the punches from the voucher, which is then removed. Ordinarily the cover is left closed until the truck reaches the next house for another delivery.

In order to discharge the paper discs or punches I provide a discharge slot 350 (Figs. 1, 5 and 6), and the punchings are guided to the slot by a plate 352 (Fig. 5).

In adjusting the thumb knobs 22 they are turned counterclockwise, clockwise rotation being prevented by springs 354 (Figs. 6 and 12) co-operating with the notches in print wheels or lock discs 266. The spring dogs 262 (Fig. 8) associated with ratchet wheels 114 prevent the dials of the run counter from turning counterclockwise. They are too light in pressure (in order not to load the register) to prevent the dials from turning clockwise, and it is primarily for this reason that the thumb knobs are limited to a counterclockwise rotation.

It is believed that the construction and operation of my improved register with preset printing mechanism, as well as the many advantages thereof, will be apparent from the foregoing detailed description thereof. It will also be apparent that while I have shown and described my invention in a preferred form, many changes and modifications may be made in the structure disclosed, without departing from the spirit of the invention as defined in the following claims.

I claim:

1. A register assembly with preset printing mechanism, said register comprising counter wheels, print wheels corresponding to said counter wheels, presettable mechanism for turning said print wheels to a desired reading, trip mechanism arranged to be tripped when the counter wheels reach the reading of the print wheels, a printing station arranged to receive a paper voucher, and means to cause the print wheels to print the voucher.

2. A register assembly with preset printing mechanism, said register comprising counter wheels, print wheels corresponding to said counter wheels, presettable mechanism for turning said print wheels to a desired reading, trip mechanism arranged to be tripped when the counter wheels reach the reading of the print wheels, a printing station arranged to receive a voucher, manually operable means to cause the print wheels to print the voucher, and a lock to prevent more than one operation of the manually operable means for one tripping of the trip mechanism.

3. A register assembly with preset printing mechanism, said register comprising counter wheels, print wheels corresponding to said counter wheels, presettable mechanism for turning said print wheels to a desired reading, trip mechanism arranged to be tripped when the counter wheels reach the reading of the print wheels, a printing station arranged to receive a voucher, manually operable means to cause the print wheels to print the voucher, and a lock including parts moved by the trip mechanism and mating with parts moved by the manually operable means

to prevent operation of the manual means prior to tripping of the trip mechanism.

4. A register assembly with preset printing mechanism, said register comprising counter wheels, print wheels corresponding to said counter wheels, presettable mechanism for turning said print wheels to a desired reading, trip mechanism arranged to be tripped when the counter wheels reach the reading of the print wheels, a printing station arranged to receive a voucher, manually operable means to cause the print wheels to print the voucher, a lock including parts moved by the trip mechanism and mating with parts moved by the manually operable means to prevent operation of the manual means prior to tripping of the trip mechanism, and a lock to prevent repeated operation of the manually operable means for one tripping of the trip mechanism.

5. A register assembly with preset printing mechanism, said register comprising a casing, a cover hinged on said casing, counter wheels in said casing, print wheels corresponding to said counter wheels, presettable mechanism for turning said print wheels to a desired reading, trip mechanism arranged to be tripped when the counter wheels reach the reading of the print wheels, a printing station arranged to receive a paper voucher, means connecting said cover and said print wheels to cause the print wheels to print the voucher, a lock to prevent operation of the cover prior to tripping of the trip mechanism, and a lock to prevent more than one operation of the cover for one tripping of the trip mechanism.

6. A register assembly and printing mechanism comprising a casing, a cover hinged thereon, a delivery or run counter in said register, print wheels corresponding to the counter wheels for printing the reading of the counter wheels at the end of a delivery, and re-setting means for said run counter connected to and operated by said cover, whereby closing and reopening of the cover resets the run counter to zero.

7. A register assembly and printing mechanism comprising a register casing, a cover therefor, counter wheels therein, print wheels corresponding to the counter wheels for printing the reading of the counter wheels at the end of a delivery, a printing station adapted to receive a voucher, and means to cause the print wheels to print the voucher, said means being operated by movement of the cover of the register.

8. A register assembly and printing mechanism comprising a register casing, a cover therefor, counter wheels therein, print wheels corresponding to the counter wheels for printing the reading of the counter wheels at the end of a delivery, a printing station adapted to receive a voucher, means to cause the print wheels to print the voucher, said means being operated by movement of the cover of the register, a cover lock and means operated by a first printing movement of said cover to make said lock operative to prevent repeated printing of vouchers.

9. A register assembly with preset printing mechanism comprising a casing, a cover hinged thereon, delivery or run counter wheels, print wheels corresponding to said counter wheels for printing the reading of the counter wheels at the end of a delivery, reset mechanism for restoring the counter wheels to zero, a printing station arranged to receive a voucher, and means so interconnecting the cover and the reset mechanism and printing mechanism that closing and open-

ing of the cover causes printing of the voucher and restoration to zero of the counter.

10. A register assembly with preset printing mechanism, said register comprising a casing, a cover hinged thereon, delivery or run counter wheels in said casing, print wheels corresponding to said counter wheels, presettable mechanism for turning said print wheels to a desired reading, trip mechanism arranged to be tripped when the counter wheels reach the reading of the print wheels, a printing station arranged to receive a paper voucher, resetting means for said run counter wheels, and means connecting said cover to said resetting means and to the print wheels in such manner that closing and opening of the cover causes printing of the voucher and restoration of the counter to zero.

11. A register assembly with preset printing mechanism, said register comprising a casing, a cover hinged thereon, delivery or run counter wheels in said casing, print wheels corresponding to said counter wheels, presettable mechanism for turning said print wheels to a desired reading, trip mechanism arranged to be tripped when the counter wheels reach the reading of the print wheels, a printing station arranged to receive a paper voucher, resetting means for said run counter wheels, means connecting said cover to said resetting means and to the print wheels in such manner that closing and opening of the cover causes printing of the voucher and restoration of the counter to zero, and a lock to prevent more than one operation of the cover for one tripping of the trip mechanism.

12. A register assembly with preset printing mechanism, said register comprising a casing, a cover hinged thereon, delivery or run counter wheels in said casing, print wheels corresponding to said counter wheels, presettable mechanism for turning said print wheels to a desired reading, trip mechanism arranged to be tripped when the counter wheels reach the reading of the print wheels, a printing station arranged to receive a paper voucher, resetting means for said run counter wheels, means connecting said cover to said resetting means and to the print wheels in such manner that closing and opening of the cover causes printing of the voucher and restoration of the counter to zero, and a lock to prevent operation of the cover prior to tripping of the trip mechanism.

13. A register assembly with preset printing mechanism, said register comprising a casing, a cover hinged thereon, delivery or run counter wheels in said casing, print wheels corresponding to said counter wheels, presettable mechanism for turning said print wheels to a desired reading, trip mechanism arranged to be tripped when the counter wheels reach the reading of the print wheels, a printing station arranged to receive a paper voucher, resetting means for said run counter wheels, means connecting said cover to said resetting means and to the print wheels in such manner that closing and opening of the cover causes perforation of the voucher and restoration of the counter to zero, a lock to prevent operation of the cover prior to tripping of the trip mechanism, and a lock to prevent repeated operation of the cover for one tripping of the trip mechanism.

14. A register assembly with preset mechanism, said register comprising a casing, a cover hinged thereon, delivery or run counter wheels in said casing, print wheels corresponding to said counter wheels for printing the reading of

the counter wheels at the end of a delivery, axially reciprocable depressor rods for moving the print wheels, said rods projecting into the path of the cover when the cover is closed, a printing station adapted to receive a paper voucher, a depressor lock to normally prevent depression of the depressor rods, and means whereby closing of the cover releases the depressor lock.

15. A register assembly with preset mechanism, said register comprising a casing, a cover hinged thereon, delivery or run counter wheels in said casing, print wheels corresponding to said counter wheels for printing the reading of the counter wheels at the end of a delivery, presetable mechanism including knobs at the top of the casing and axially reciprocable depressor rods keyed to said knobs for turning the print wheels to a desired reading, said rods projecting through said knobs and into the path of the cover when the cover is closed, trip mechanism arranged to be tripped when the counter wheels reach the reading of the print wheels, a printing station adapted to receive a paper voucher, a depressor lock to normally prevent depression of the depressor rods, and means whereby tripping of the trip mechanism releases means operable in turn to release the depressor lock.

16. A register assembly with preset mechanism, said register comprising a casing, a cover hinged thereon, delivery or run counter wheels in said casing, print wheels corresponding to said counter wheels for printing the reading of the counter wheels at the end of a delivery, presetable mechanism including knobs at the top of the casing and axially reciprocable depressor rods keyed to said knobs for turning the print wheels to a desired reading, said rods projecting through said knobs and into the path of the cover when the cover is closed, trip mechanism arranged to be tripped when the counter wheels reach the reading of the print wheels, a printing station adapted to receive a paper voucher, a depressor lock to normally prevent depression of the depressor rods, a cover lock to prevent closing of the cover prior to tripping of the trip mechanism, and means whereby closing of the cover releases the depressor lock.

17. A register assembly with preset printing mechanism, said register comprising counter wheels, print wheels corresponding to said counter wheels, presetable mechanism for turning said print wheels to a desired reading, trip mechanism arranged to be tripped when the counter wheels reach the reading of the print wheels, a printing station arranged to receive a paper voucher, manually operable means to cause the print wheels to print the voucher, a lock to prevent operation of the manual means prior to tripping of the trip mechanism, a preset lock to prevent change of the preset reading after cocking of the trip mechanism, and means responsive to operation of the manual means and completion of the printing operation to release the preset lock.

18. A register assembly with preset printing mechanism, said register comprising counter wheels, print wheels corresponding to said counter wheels, presetable mechanism for turning said print wheels to a desired reading, trip mechanism arranged to be tripped when the counter wheels reach the reading of the print wheels, a printing station arranged to receive a paper voucher, manually operable means to

cause the print wheels to print the voucher, a lock to prevent operation of the manual means prior to tripping of the trip mechanism, a lock to prevent more than one operation of the manually operable means for one tripping of the trip mechanism, a preset lock to prevent change of the preset reading after cocking of the trip mechanism, and means responsive to operation of the manual means and completion of the printing operation to release the preset lock.

19. A register assembly with preset printing mechanism, said register comprising a casing, a cover hinged thereon, counter wheels in said casing, print wheels corresponding to said counter wheels, presetable mechanism for turning said print wheels to a desired reading, trip mechanism arranged to be tripped when the counter wheels reach the reading of the print wheels, a printing station arranged to receive a paper voucher, means connecting said cover and print wheels to cause the print wheels to print the voucher, a lock to prevent operation of the cover prior to tripping of the trip mechanism, a lock to prevent more than one operation of the manually operable means for one tripping of the trip mechanism, a preset lock to prevent change of the preset reading after cocking of the trip mechanism, and means responsive to closing of the cover and completion of the printing operation to release the preset lock.

20. A register assembly with preset perforating mechanism, said register comprising counter wheels, perforating impression wheels corresponding to said counter wheels, presetable mechanism for turning said impression wheels to a desired reading, trip mechanism arranged to be tripped when the counter wheels reach the reading of the impression wheels, a perforating station arranged to receive a paper voucher, and manually operable means to cause the impression wheels to perforate the voucher.

21. A register assembly with preset perforating mechanism, said register comprising counter wheels, perforating impression wheels corresponding to said counter wheels, presetable mechanism for turning said impression wheels to a desired reading, trip mechanism arranged to be tripped when the counter wheels reach the reading of the impression wheels, a perforating station arranged to receive a paper voucher, manually operable means to cause the impression wheels to perforate the voucher, a lock to prevent operation of the manual means prior to tripping of the trip mechanism, and a lock to prevent more than one operation of the manually operable means for any one tripping of the trip mechanism.

22. A register assembly and perforating mechanism comprising a register casing, a cover therefor, counter wheels therein, perforating wheels corresponding to the counter wheels for printing the reading of the counter wheels at the end of a delivery, a perforating station adapted to receive a voucher, means to cause the perforating wheels to perforate the voucher, said means being operated by closing of the cover of the register, and a cover lock including a latch and means responsive to closing of the cover to release said latch from inoperative to operative position, in order to prevent repeated perforating of the vouchers.

23. A register assembly with preset perforating mechanism comprising a casing, a cover hinged thereon, delivery or run counter wheels, perforating impression wheels corresponding to

said counter wheels for printing the reading of the counter wheels at the end of a delivery, reset mechanism for restoring the counter wheels to zero, said reset mechanism including pawl and ratchet devices, a perforating station arranged to receive a paper voucher, and means so interconnecting the cover and the reset mechanism and perforating mechanism that closing of the cover causes perforation of the voucher and backward movement of the pawl and ratchet devices, and opening of the cover causes forward movement of the pawl and ratchet devices and consequent restoration to zero of the counter.

24. A register assembly with preset perforating mechanism, said register comprising counter wheels, perforating impression wheels corresponding to said counter wheels, presettable mechanism for turning said impression wheels to a desired reading, trip mechanism arranged to be tripped when the counter wheels reach the reading of the impression wheels, a perforating station arranged to receive a paper voucher, manually operable means to cause the impression wheels to perforate the voucher, a lock to prevent operation of the manual means prior to tripping of the trip mechanism, a lock to prevent more than one operation of the manually operable

means for one tripping of the trip mechanism, a preset lock to prevent change of the preset reading after cocking of the trip mechanism, and means responsive to closing of the cover and completion of the perforating operation to release the preset lock.

25. A register assembly with preset printing mechanism, said register comprising counter wheels, print wheels corresponding to said counter wheels, presettable mechanism for turning said print wheels to a desired reading, trip mechanism arranged to be tripped when the counter wheels reach the reading of the print wheels, a printing station arranged to receive a voucher, manually operable means to cause the print wheels to print the voucher, a lock including a latch and means responsive to operation of the manually operable means for releasing said latch from inoperative to operative position in order to prevent repeated operation of the manually operable means, and means operated by said trip mechanism for restoring said latch from operative position to inoperative position, whereby only one operation of the manually operable means may be had for one tripping of the trip mechanism.

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