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LIQUID MEASURE INDICATOR

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This invention relates to a combined measurement indicator and registering device for use particularly with pumps, such as used at filling stations, for delivering measured quantities of gasoline.

I have shown the invention as applied to a pump of the type employing a vertically movable rack bar which is operated by turning a crank, the height to which the rack bar is moved determining the quantity of gasoline delivered. In principle, however, the invention is applicable to other types of pumps having a part movable a defined distance for a given quantity of gasoline to be delivered.

In pumps of the type referred to, however, the rack bar usually has a maximum movement of twenty-three inches, and in this maximum movement the pump is supposed to deliver five gallons of gasoline. It frequently happens, however, that when the machine is tested, a movement of the rack bar less than twenty-three inches will deliver five gallons, or else a movement greater than twenty-three inches will be required to deliver five gallons. The variation either way practically never exceeds one-eighth of an inch. Such variation in the quantity of gasoline delivered for a given movement of the rack bar may be due to various causes, among which may be mentioned wearing of the packing in the piston of the pump, allowing gasoline which would otherwise be delivered, to seep back into the tank; and differences in the consistency of the gasoline due to changes in temperature.

These variations in the operation of the pump are important for the reason that the oil companies selling the gasoline to the filling station, have their own private registering device and frequently the amount of gasoline remaining in the tank will not check up with this registering device. For example, according to the oil company's register, there should be, say, fifty gallons of gasoline left in the tank. When the gasoline in the tank is gauged, however, there may be only ten gallons remaining. The proprietor of the filling station will then claim that the pump has delivered more gasoline than it should and the oil company has no way of disproving this and hence must allow such proprietor a credit of forty gallons. As a matter of fact, what frequently occurs, is that a dishonest proprietor of a filling station will manipulate the pump in a way known to him to withdraw gasoline from the tank, without operating the register, to an extent within a probable limit of error of the pump, and sell such gasoline, then compel the oil company to allow him a credit for the amount sold.

It is one of the objects of my invention to provide an indicating device to be mounted on a gasoline pump in a manner to be actuated by the turning crank, for indicating to the purchaser the exact amount of gasoline delivered.

Another object of the invention is to provide in such an indicating device, improved compensating mechanism which may be adjusted to cause the indicating device to indicate accurately the amount of gasoline delivered whether the rack bar moves the full distance to which the mechanism is calibrated for a given quantitative measurement, or more or less than such distance.

A further object of the invention is the provision of a registering device operated in connection with the indicating device, for registering the total amount of gasoline delivered during a given period of time, and to combine therewith a shutter which is under the control of the oil company and which normally conceals the registering device from view.

My improved indicating and registering device is wholly within the control of the oil company; that is, it is inaccessible to the proprietor of the filling station. In practice, the gasoline pumps at these filling stations are tested every day. In the use of my invention, the inspector of the oil company operates the pump to deliver, say, five gallons. If this is done by a movement of the rack bar to a distance, say, of twenty-two and seven-eighths inches, he then sets the compensating device of the indicating mechanism so that when the pump is operated to deliver five gallons, the hands of the indicator will show exactly five gallons. In this movement, the hand of the indicator is automatically advanced by the compensating device the remaining distance corresponding to a movement of one-eighth of an inch of the rack bar. If the inspector finds that the rack bar must be moved, say,
twenty-three and one-eighth inches to deliver five gallons, he sets the compensating mechanism of my device accordingly, and in this movement the hands of the indicator will be automatically moved backward a distance corresponding to that to which they would have been moved by the extra one-eighth inch movement of the rack bar. The adjustment of the compensating device having been made, the device is then locked and all movements of the crank handle, made in operating the pump to deliver gasoline, will cause both the indicating and registering device to operate so that no matter whether the oil company’s register is actuated or not, it would be impossible to deliver gasoline without the quantity being registered by my device. This is for the reason that it is impossible to deliver gasoline from the pump without actuating the crank handle.

By the use of my improved device, therefore, I not only enable the purchaser to see that he gets the full amount of gasoline purchased, but I also prevent a dishonest proprietor from cheating the oil company furnishing him the gasoline.

The invention is illustrated in the accompanying drawing in which—

Figure 1 is a view in side elevation of the upper part of a gasoline pump provided with my improved device;

Figure 2 is a vertical sectional view of a part of the mechanism shown in Figure 1 and viewed in a plane at right angles to that of Figure 1;

Figure 3 is a view in front elevation, on an enlarged scale, of my improved registering device, a part of the front of the casing being broken away to show the registering device and the shutter which normally conceals the same, the shutter in this instance being shown open;

Figure 4 is a vertical sectional view taken on the line 4—4 of Figure 3;

Figure 5 is a sectional elevation taken on the line 5—5 of Figure 4;

Figure 6 is a similar view taken on the line 6—6 of Figure 4;

Figure 7 is a view in side elevation of the machine, as shown in Figure 5, and viewed in the direction of the arrows 7—7 indicated in said figure;

Figure 8 is a similar view viewed in the direction of the arrows 8—8 of Figure 5;

Figure 9 is a diagrammatic view, on an enlarged scale, illustrating the connections of the driving mechanism of the machine;

Figure 10 is a detail sectional view on an enlarged scale illustrating the clutch connection between the crank shaft of the pump, and my improved device;

Figure 11 is a cross-sectional view illustrating the clutch mechanism of the machine by means of which it may be reset to zero, and the operating means therefor;

Figure 12 is a face view of the compensating cam, the view being taken on the line 12—12 of Figure 4;

Figure 13 is a cross-sectional view taken on the line 13—13 of Figure 12;

Figure 14 is a detail view, in plane, illustrating the form of reduction mechanism which I employ;

Figure 15 is a detail view, on an enlarged scale, illustrating the mechanism shown at the center of Figure 4 for causing the advance or recession of the indicating mechanism as effected by the compensating cam; and

Figure 16 is a section on an enlarged scale taken on the line 16—16 of Figure 3, and illustrating more particularly the drive for the register.

Referring now to the drawings, (Figures 1 and 2), the numeral 1 indicates the upper part of a gasoline pump, in which is mounted a shaft 2 adapted to be turned by a crank 3. Slightly mounted to work through the top of the pump are two rack bars 4 connected at their upper ends by a cross-head 5, centrally of which is secured the piston rod 6 of the pump. Mounted on the shaft 2 are two pinions 7 in mesh with the teeth of the rack bars 4 and which, when the shaft 2 is rotated, operate to raise and lower said rack bars. Adjacent one of the rack bars is a screw-threaded rod 8 on which are adjustably mounted a series of stops 9, one or the other of which is adapted to be turned to be engaged by a finger 10 on the adjacent rack bar, according to the quantity of gasoline to be delivered. That is to say, if one gallon is to be delivered, the lower stop 9 would be turned to be engaged by said finger; if two gallons, the second stop from the bottom, and so on.

The construction of the pump as thus far described is well known and, in itself, forms no part of my invention.

My improved device is adapted to be operatively connected with the end of the shaft 2, and, to this end, it is secured to the casing of the pump on the outside thereof, and a suitable clutch connection, to be described, made with the end of the shaft 2. My device, as a whole, is indicated by the numeral 11, and its position on the pump is indicated in Figures 1 and 2.

The device comprises a base 12 (Figure 4), which is preferably curved to conform to the curvature of the pump casing and is secured to said casing in any suitable way, as by being bolted or screwed thereto, said bolts or screws passing through apertures 13 in said base, as will be understood. Secured on this base is a circular casing 14 which, at its front, is provided with a circular sight-opening 15, covered by a glass panel 16 (Figures 3 and 4). Screwed into the base 1 are a series of lag-screws 17,
which pass through apertures in an inner circular frame plate 18 and an outer circular frame plate 19 (Figure 4), the said frame plates being held in spaced relation by sleeves 20 located between the base 12 and frame plate 18, and sleeves 21 located between the frame plates 18 and 19, the lag-screws passing through these sleeves, and the heads 22 thereof bearing against the outer frame plate 19 when said lag-screws are screwed into the base.

Supported beneath the glass panel 16 on the front frame plate 19 and spaced therefrom is a dial 23 (Figures 3 and 4), which is provided with a circular series of graduation marks 24 indicating gallons, and a circular series of numbers 25 located opposite these graduation marks, and, in the device as illustrated, running from 1 to 20. Half-gallon graduation marks 26 are also placed on the dial. Co-operating with the dial 23 and positioned to move over the same is a long hand 27 and a short hand 28, corresponding, respectively, to the minute and hour hands of a clock, the long hand being driven in a manner to encircle the dial for each gallon of liquid measured, while the short hand travels from one graduation mark 24 to the next in each circuit of the dial by the long hand. In the use of my device, the long hand 27 co-operates with the hand 28 to indicate full gallon measurements. That is to say, if the sale is of five gallons of gasoline, the indicating operation will be completed when the short hand 28 is at 5 and the long hand 27 at the zero position, or the position indicated on the dial in Figure 3 as 20.

The relation of the driving mechanism, to be later described, with the rack bar of the pump, and the calibration of the dial are such that for a full stroke of twenty-three inches the stroke of the rack bar is less or greater than the calibrated distance of twenty-three inches.

I will now proceed to describe the driving mechanism for operating the hands of the indicating device from the shaft 2, and the compensating mechanism, part of which is included in said driving mechanism, by means of which the correct position of the hands of the indicator is assured, in accordance with the performance of the pump.

The long hand 27 is mounted on the outer end of a central arbor 29 (Figure 4), and the short hand 28 is secured on the outer end of a sleeve 30, which is rotatably mounted on the outer end of said arbor. Both the arbor and the sleeve project through the front frame plate 19 and the dial 23, while the arbor 29 at its opposite end is journaled in the frame plate 18. The shaft 2 has secured on its outer end a one-way clutch 31 (Figure 2), said clutch being shown in detail in Figure 10. This clutch comprises a circular casing 32, in which is housed a disk 33 secured on the end of a shaft 34. The disk 33 is provided with cam grooves 35, in which are located rollers 36. This construction is also illustrated in connection with another clutch of the same construction in Figure 6, where one of the grooves and rollers is shown and given the same reference numerals. The casing 32 of the clutch has secured to its rear side a flexible disk 37, supported at opposite ends of a cross-bar 38, which is centrally secured on the end of a stub shaft 39. The outer end of this stub shaft is squared and inserted in a similar socket 40 provided in the end of the shaft 2. When the stub shaft 39 is turned by the shaft 2 in one direction, the roller 36 will be forced to engage between the bottom of the groove 35 and the inner wall of the casing 32 by a spring plunger 30 (Figure 6), and the shaft 34 will be turned. When the stub shaft 39 is turned in the opposite direction, the roller 36 will pass to the deeper portion of the groove 35, and the casing 32 will revolve about the disk 33 without turning it. The shaft 34 (Figure 4) passes through the base 12, where it is secured to a disk member 41 of a clutch corresponding in construction and operation to the clutch 31, except that the casing 42 of said clutch is secured to the base 12, as by means of screws 43.

Secured on the disk 41 is a stub shaft 44, on the inner end of which is secured a pinion 45 (Figures 4 and 6). When the shaft 34 is turned in one direction, the roller 36 will bind between the disk 41 and the casing 12 and prevent rotation of pinion 45. When the shaft 34 is turned in the opposite direction, or anti-clockwise as shown in Figure 6, the roller 36 will run free in groove 35 and the pinion 45 will be rotated. This pinion...
is in mesh with a gear 46 (Figures 6 and 11), which is fast on a clutch member 47, forming part of a clutch mechanism to permit resetting of the machine, and which clutch mechanism may be conveniently described at this point. 

The clutch member 47 is provided with a tapering recess 48, which is normally frictionally engaged by a conical-shaped clutch member 49, having a hub 50, projecting through an opening in the frame plate 18, on which is fixedly secured a gear 51. The clutch member 49 and gear 51 are rotatably mounted on the reduced portion 52 of a thrust bar 53. The thrust bar is supported at one end by mounting the end of the reduced portion 52 in a bracket arm 54 secured on the frame plate 18, and at its opposite or inner end by being slidably mounted in a sleeve 55 secured in the base 12. 

Secured on the thrust bar 53 at some distance from the clutch member 47 is a collar 56, and between this collar and a plate 57 secured on the inner side of the clutch member 47 is a coil spring 58. 

Pivotedally mounted at 59 (Figure 11) on a bracket 60, mounted on base 12, is a clutch lever 61 having a bifurcated inner end 62 extending around the thrust bar 53 beneath the collar 56. The clutch lever 61 is engaged at its outer end by the bifurcated end 63 of a push bar 64 (see also Figure 8), which projects through the frame plates 18, 19 and the dial 23 and the front marginal portion of the casing 14, and is provided on its outer end with a push button 65. By pressing inward on this push button, the inner end of the clutch lever 61 will be caused to engage the collar 56 and move the thrust bar 53 outward, thereby releasing the clutch member 49 from engagement with the clutch member 47 and permitting the gear 51 to rotate independently of the gear 46. This is done in the resetting operation, which will be later described. 

Continuing now with the description of the driving mechanism, the gear 51 (Figures 5 and 11) meshes with an idler gear 51a (Figure 16), which is in mesh with a gear 66 (Figures 4 and 15), which gear drives the shaft 29 on which the long hand 27 is secured, such driving being effected through compensating mechanism, a part of which will now be described. 

Secured on opposite sides of gear 66 and projecting outwardly therefrom are two pins 67. Slidably mounted on the shaft 29 is a disk 68, projecting from the inner face of which are sleeves 69 in which, and in coinciding apertures in said disk, the pins 67 are slidably mounted. Projecting from opposite sides of shaft 29 and in line with each other are two pins 70, and extending inwardly in oppositely inclined directions from opposite edges of the disk 68 and from the inner face thereof, are two parallel arms 71 (Figure 15), each pair of arms embracing a pin 70. The disk 68 is provided with a circumferential groove 72 and is partly surrounded by a yoke 73 having on its inner side pins 74 engaging in groove 72. The yoke 73 (Figure 7) is on the end of an arm 75, which is pivotally secured at 76 to a dog 77, which is pivotally mounted at its outer end at 78 on a post 79, mounted on the frame plate 18. The dog 77 has an inwardly extending arm 80 (see also Figures 4, 12 and 13), which bears against the inner face of a cam disk 81 having a cam surface 82. A spring 83, connected at one end to the dog 77 and at its other end to the frame plate 19, tends normally to draw the arm 80 into engagement with the cam surface 82. The arm 75 is provided intermediate its length with a slot 84, in which a pin 85 (Figure 5), mounted on the end of the arm 86 of a bell-crank lever 87 pivoted at 88 on the frame plate 18. The arm 86 is adapted to be moved in one direction or the other in the slot 84 to vary the throw of the yoke 73 for a purpose presently to be described. This movement of arm 86 is effected by means of a set screw 89 (Figure 8), having screw-threaded engagement with a post 90 mounted on the frame plate 18, and having its end rotatably engaged with the other arm 91 of the bell-crank lever 87. The arm 86 is maintained under tension of a coil spring 92, secured at one end to said arm and at its other to one of the sleeves 21. This spring will prevent any vibration of said arm, or, in other words, will operate to hold it securely to any position to which it may be moved by turning the screw 89. 

It is the function of the cam disk 81 to operate the arm 75 in the operation of the indicating mechanism to raise or lower the disk 68, whereby, through the arm 71, to advance or retard the movement of the shaft or Arbor 29 on which the long hand 27 is mounted, as will be more fully explained hereinafter. The cam 82 has a high and low point, as shown by Figure 13, and in order to determine in which direction the differential movement of the hand 27 shall occur, it is necessary to set the cam disk 81 so that the arm 80 shall be positioned at the low point of the cam and the latter pass over said arm from its low to its high point, if an increment in movement of the pointer 27 is desired, or else the said cam shall be set with the arm 80 positioned at its high point and the cam pass over said arm from its high to its low point if the movement of the pointer 27 is to be diminished. To this end, the cam disk 81, as shown by Figure 8, is provided on one side with a plus sign 93 to indicate that when the disk 81 is in this position,
the lowest point of cam 82 is in engagement with arm 80. On the opposite side of the disk 81 there is a minus sign (not shown) to indicate that when the disk is turned to display this sign, the high point of the cam 82 will engage the end of arm 80 to retard or diminish the movement of the hand 27.

In order to determine the exact position to which to turn the cam disk 81 and to hold it in such position, I rotatably mount in its outer side, that is the side facing the frame plate 19, a ball 94 (Figure 13), which is normally pressed outward by means of a spring arm 95 (Figure 12), which is secured at one end, as indicated at 96, to the inner side of the disk 81. The outer side of the cam is flat and bears against the face of a large gear 97, which is provided with two recessed apertures 98 and 99, respectively, one or the other of which is adapted to receive the ball 94 and to have it held therein by the spring arm 95. When the ball is in the aperture 98, the cam will be in the plus position, and when it is in the aperture 99, it will be in the minus position. The gear 97 and the cam disk 81 are rotatably mounted on a head 100 secured on the end of a post 101, which is mounted on the frame plate 18 (Figure 8), and they are held in firm engagement with each other by means of a coil spring 102 interposed between said disk and a collar 103 secured on said post. The cam disk 81 is driven from the gear 97 through the chain of gears which operates the short hand or pointer 28, and this driving mechanism will now be described.

Secured on the arbor 29 is a stop plate 104 (Figure 4), having secured to it a gear 105, projecting from the outer face of which, at its center, is a cam 106. Encircling this cam is an apertured head 107 (Figure 14) on an arm 108, which arm has at its outer end a guide-slot 109 fitting around one of the sleeves 21 (Figures 5 and 7), and near the head 107 an aperture 110. Encircling the cam 106 is a toothed disk 111 which is provided near its periphery with a stud 112 engaging in the aperture 110, and which prevents the said disk from rotating, but permits the gyratory movement thereof. Rotatably mounted on the arbor 29 is a planetary gear 113 having peripheral teeth, between which certain of the teeth of the disk 111 are adapted to engage in order under the gyratory motion of said disk. Secured on the planetary gear 113 is the sleeve 30 (see also Figures 7 and 8), which rotates on the arbor 29 and has mounted on its outer end the short hand 28 (Figure 3).

The mechanism just described forms a well-known type of reduction gearing, and does not, in itself, constitute a feature of the present invention. Its purpose, in the present instance, is to effect a driving connection between the arbor 29 and the sleeve 30, having the ratio of twenty to one. That is to say, as the hand 27 is turned by arbor 29 to completely encircle the dial 23, the short hand 28 will be turned by sleeve 30 one-twentieth of such distance, or the distance between any two of the gallon graduations on the dial.

In the operation of this reduction gearing, as the cam 106 is rotated by the arbor 29, as the disk 111 cannot rotate, owing to the connection of its stud 112 with the aperture 110 in the arm 108, said disk will be given a gyratory movement, and a few of its teeth will successively engage a like number of teeth, in succession, around the periphery of the planetary gear 113 and cause said gear to be rotated, but at a much lower rate of speed than that of the arbor 29. Mounted on the sleeve 30 above the planetary gear 113 is a pinion 115 (Figures 5 and 7), which meshes with the large gear 97 associated with the cam disk 81, previously referred to (see Figure 13). The relation between the size of the pinion 115 and that of the gear 97 is such as to produce a ratio of movement between them as of two to one. Thus, while the short hand 28, actuated by sleeve 30, is making the entire circuit of the dial 23, the gear 97 will only be rotated through a half revolution, thereby moving the cam disk 81 through one-half a revolution, or from the low to the high position of the cam surface 82 relative to the arm 80, or vice versa. The operation of the compensating mechanism thus described, in co-operation with the driving mechanism, will now be explained.

Assuming that the end of a five-gallon measurement, the long hand 27 comes to rest in the position indicated in Figure 3, this would indicate that five gallons of gasoline had been delivered on a stroke, say, of twenty-two and seven-eighths inches of the rack bar 4 of the pump, or, which is the same thing, of the piston rod 6 of the pump. The compensating mechanism of my device would then be set to insure that in the measurement of five gallons, the hand 27 would come to rest at the zero position, or that indicated by the numeral 20. This would require, of course, that an increment of movement should be added to the normal movement of the hand 27. To accomplish this, the operator would turn the cam disk 81 to show the plus sign, or to the position indicated in Figures 8 and 13. He next adjusts the arm 86 by turning the set screw 89 to insure that the movement of the dog 77, effected by the engagement of its arm 80 with the cam surface 82, will cause the disk 68 (Figures 4 and 15) to be moved upward the proper distance to effect the required amount of advance movement of the
arbor 29 to cause the long hand 27 to rest at zero at the end of a five-gallon measurement, involving a complete stroke of the rack bars 4.

To enable the operator to determine how far and in what direction to move the arm 86, I preferably provide on the frame plate 18 a scale 116 (Figure 5), with which cooperates a pointer 117 secured on the hub of the bell-crank lever 87. This scale, as shown, has a central zero point and plus and minus graduations extending from opposite sides of said point. This scale may be calibrated, initially, in accordance with the relation of various degrees of movement of the pointer 117, and the position of the hand 27 established thereby; but, in practice, as the variations in the position of the hand 27 do not ordinarily extend beyond an eighth of an inch in either direction, I find it sufficient to provide a series of graduations for the scale 116 about one-sixteenth of an inch apart, and the operator soon learns, by experience, the position to move the pointer 117 on said scale in order to effect an advance or retarding movement of the hand 27 to a required degree.

Having properly positioned the pin 85 in the slot 84 of the arm 75 by moving the screw 89 in the manner stated, the operator then turns the crank 3 to effect a measurement of the gasoline. In this movement, the gear 97 will be rotated by the pinion 115 (Figure 5), and the cam surface 82 will pass under the arm 80 from its low to its high position. This will operate to move the arm 80 inward, and, by means of the pivotal connection 76 (Figure 7) of the dog 77 with the lever 75, will cause the yoke 73 to be raised, thereby raising the disk 68, which is rotated by the gear 66 (Figures 4 and 15). As the disk 68 is raised, the arm 71 thereon engaging the pin 70, will operate to advance the movement of the arbor 29 so that at the end of the stroke of the rack bar 4 when the small hand is at 5, the long hand 27 will be at the graduation 20.

In the event the hand 27, in the initial measuring operation, should have passed beyond the graduation at 20, this would indicate that the movement of the arbor 29 should be retarded or diminished in the measuring operation, and accordingly the cam disk 81 would be turned to the minus position, or, in other words, to bring the high point of its cam surface 82 under the arm 80. The screw 89 would then be turned to place the pointer 117 at the correct position on the minus side of the scale 116, and in the ensuing measuring operation, the yoke 73 would be lowered in the movement of the cam disk, through the action of the spring 83 in drawing the arm 80 into engagement with the cam surface 82 as the latter proceeds from its high to its low point. In this movement, the arm 71, moving downward on the pin 70, will retard or diminish the movement of the arbor 29, so that at the end of the five-gallon measurement, the hand 27 will come to position at the graduation 20.

In connection with the indication of measurement, my device provides means for registering the total amount of gasoline delivered by the pump over any given period of time. To this end, I provide a register 118 (Figure 3), the numbers on the wheels of which appear through the window 119, in the dial 23, but which numbers are normally concealed from view by a shutter 120, which is held in its closed position, or over the numbers of the register, by a coil spring 121. This shutter is provided with a key-hole 122 of any preferred non-circular shape, which is accessible through an opening in the dial 23 when the casing is removed, and the representative of the oil company, who alone has this key, by inserting it in the key-hole 122, can turn the shutter 120 to one side and ascertain the total amount of gasoline which has been sold. The gearing for driving this register will now be described.

The gear 105, previously referred to, as being located above the stop plate 104 on the arbor 29 (Figure 4), meshes with a gear 123 (Figures 5 and 8), which is fast on an idler shaft 124 mounted at its ends in the respective frame plates 18 and 19. On the lower end of this shaft is secured a similar gear 125 (Figure 8), which is in mesh with a gear 126 (Figure 5), which is supported in a bracket arm 127 secured on the frame plate 19. The gear 126 meshes with a gear 128, which is fast on the outer end of a short stub shaft 129 rotatably mounted in the frame plate 18. Secured on the outer side of the gear 128 is a clutch casing 130, in which is mounted a grooved clutch disk 131, in which work rollers 132, this clutch being, in all respects, similar to the clutches shown in Figures 4, 6 and 10, and previously described. Secured on the outer side of the clutch disk 131 is a shaft 133 (Figure 8) having secured on its outer end a beveled gear 134 (see also Figures 3 and 5). The outer end of said shaft extends through the frame plate 19 and has a bearing in a bracket arm 155 (Figure 9) on the frame plate 19. The beveled gear 134 meshes with a similar beveled gear 136 (Figure 16), mounted on the operating shaft of the register 118. The clutch 130, 131, interposed in the driving connection to the register, is for the purpose of preventing any reverse movement of the register wheels 118 in the resetting operation of the machine. In order to take up any lost motion between the teeth of the gears, or which may be pro-
duced between the groove in the disk 131 and the roller 132. I mount on one of the sleeves 21 a spring clamp 137 (Figures 5 and 8), the ends of which frictionally embrace the shaft 133 of the clutch. As the indicating operation proceeds, the gearing described will operate the register wheels 118 to show the total amount of gasoline dispensed, and this operation is repeated with each measuring operation, so that the register totals the amount of gasoline dispensed in any given period of time.

In order to enable the hands 27 and 28 to be returned to the zero position after a measuring operation, I provide the following reset mechanism. The idler gear 51, previously referred to, which is driven by the main drive gear 51, is mounted on an idler shaft 138 (Figures 6 and 10), which is rotatably mounted in its respective ends in the frame plate 18 and the base 12. Secured on the inner end of this shaft is a pinion 139 which is in mesh with a gear 140, which is rotatably mounted on the inner end of a shaft 141, mounted at one end in the base plate 12 and at its inner end in the frame plate 19. Surrounding this shaft is a coil spring 142 secured at one end to the gear 140 and at its opposite end to the shaft 141. The shaft 140 is held against rotation by having its outer end squared, as indicated at 143 in Figure 3, and engaged in a squared recess in the end of a clip 144 secured on the frame plate 19. As the gear 140 is rotated in the measuring operation, tension will be imparted to the coil spring 142, and the power of this spring is utilized to reset the mechanism to zero when the clutch member 57 is released from engagement with the clutch member 47 by pressing inward on the reset button 65, as previously described. When this operation is effected, the driving mechanism beyond the clutch member 47 and 57 is released from control of the clutch 41 and 42, which normally holds the mechanism against reverse movement.

I provide means for holding the reset button and the lever 61, which operates the clutch in the depressed position, until the hands 27 and 28 have returned to the zero position. This mechanism is shown particularly in Figures 5, 7 and 11, and will now be described.

Mounted on the frame plate 18 is a bracket plate 145, pivotally mounted on which at its outer end, as indicated at 146, is one member 147 of a toggle lever 148, which is pivotally connected at its inner end, as indicated at 149, to the outer end of the other member 150 of the toggle lever. The inner end of the lever 150 is bifurcated to embrace the upper edge of the clutch lever 61. A leaf spring 151, secured at its upper end to the bracket plate 145 and having its free end bearing against the joint of the toggle lever, tends normally to straighten the toggle. When the clutch lever 61 is depressed, the spring 151 straightens the two members 147 and 150 of the toggle lever, so that if the operator removes his finger from the push button 65 after depressing it, the lever 61 will be held depressed by the toggle lever 148 until the hands 27 and 28 have returned to zero.

I provide means for automatically stopping the return movement of the mechanism when the hands have reached the zero position, and combined with this mechanism is a mechanism for breaking the toggle lever 148 to permit the lever 61 to return to its normal position. These mechanisms will now be described.

Pivotally mounted at its end in the frame plates 18 and 19 is a rock shaft 152 (Figures 5 and 7), on the outer end of which is secured two dogs 153 and 154, separated from each other and rigidly secured together by a hub 155. The free end of the outer dog 153 extends into the path of a projection 156 (Figure 14), extending from a plate 157, mounted to rock on the sleeve 114 above the planetary gear 113, previously referred to (Figure 4). The plate 157 is allowed a slight movement in either direction by being provided with an opening 158 working over a tongue 159, preferably struck up from the body of the gear 113. The outer end of the inner dog 154 extends into proximity to the periphery of the stop plate 104, which is cut away to provide a shoulder 160, to be engaged by the end of the dog 154 (Figures 4 and 5). A spring 161 (Figure 5) normally holds the dog 154 out of the path of movement of said shoulder.

In the resetting operation, as the hands approach the zero position, the projection 156 will engage dog 153, and thereby turn dog 154 inward, or toward the periphery of the stop plate 104, and as the hands reach zero, the shoulder 160 of the stop plate will engage dog 154 and prevent further movement of the mechanism.

To break the toggle lever 148, I secure on the inner end of the rock shaft 152 an arm 162 (Figures 5 and 7), having at its outer end an adjusting screw 163, which is adapted to hit a plate 164 carried by the toggle lever 148 at its joint. When the dog 153 is engaged by the projection 156, the rock shaft 152 will be turned, which will cause the arm 163 to be moved outward, and the screw 163 to engage the plate 164 of the toggle lever and break the same.

Finally, I will describe the governing device which operates to prevent excessive rapidity in the rotation of the gears as the
machine returns to the zero position. Rotatably mounted between the frame plate 18 and the base 12 (Figures 5, 6 and 8) is a shaft 166 which has secured on its inner end a pinion 167 which is in mesh with the gear 140, previously referred to. Rigidly secured on the inner side of the plate 18 is a circular casing 168, and keyed to the outer end of shaft 166 is a disk 169 which has pivotally mounted on it a series of friction arms 170, three of these being used in practice, and one of such arms being shown in Figure 6. The gear 140 is rotated by the power of spring 142, and, in operation, through pinion 167, will rotate the shaft 166 and the disk 169, and the arms 170 will be thrown outward by centrifugal action to frictionally engage the side walls of the casing 168 and retard the movement of the gear 140.

The operations of indicating measurement, compensating for variations between the stroke of the pump piston and the movement of the indicating hands to cause accurate indication, registering the total quantity of gasoline measured during a given period of time, and resetting the machine to zero, have all been described in the course of the detailed description of the various mechanisms entering into these operations. It remains only to point out the advantage to the customer and to the oil company supplying oil to the filling station of the use of any device on the pump, or pumps, at such filling station.

By referring to Figure 3, it will be seen that the casing of the indicating device is normally sealed against being opened by any suitable sealing device, such as indicated at 165. Further, as heretofore set forth, the register, showing the total amount of gasoline dispensed, is normally hid from the view of the proprietor of the filling station. In the operation of the device, it will be seen that it would be impossible for the man at the filling station to deliver gasoline by operating the crank handle without operating the registering device as well as the indicating mechanism; and as he never has access to the register, and does not know when it is reset, or how much it totalizes at any given time, he is unable to fraudulently operate the registering mechanism to cause it to show less than the total amount of gasoline actually delivered by the pump. The customer, by merely looking at the indicator, can determine if the filling station proprietor has given him the full amount of gasoline purchased. As the pump is tested every day and the compensating device adjusted, if necessary, to secure the accurate positioning of the indicating hand 27, absolute accuracy in indication of measurement is assured.

It should be stated that in the event the pump, upon testing should be found to be delivering five gallons of gasoline for a twenty-three inch stroke of its piston, the pin 85 would be moved to the end of the slot 84 nearest the disk 68. In this position the almost infinitesimal movement of the disk which would result in operation will be neutralized by the backlash in the gears.

I have shown in the drawing and described herein a preferred embodiment of my invention. I wish it understood, however, that, so far as the broad principles of the invention are concerned, I do not wish to be limited to the particular embodiment set forth, nor to the precise details of construction described and illustrated, except as the latter may be specifically referred to in certain of the claims.

I claim:

1. In a liquid measure indicator, an operating shaft, a dial provided with numbered gradations and having hands movably thereover, driving mechanism interposed between said shaft and hands, including a compensating drive, a cam member rotatable by said driving mechanism, means for controlling said compensating drive from said cam, and means for adjusting said cam in either of two positions to effect, through said compensating drive, an advance or a retardation in the movement of said hands in proportion to variations in the extent of movement of said part to effect the discharge of a given quantity of liquid, to insure accurate indication of measurement by said hands.

2. In a liquid measure indicator, an operating shaft, a dial provided with numbered gradations and having hands movably thereover, driving mechanism interposed between said shaft and hands including a compensating drive, a cam member rotatable by said driving mechanism, a lever associated at one end with said compensating drive and adapted to be engaged at its other end by said cam member, means for adjusting said cam in either of two positions to effect, through said compensating drive, an advance or a retardation in the movement of said hands, and means for adjusting the fulcrum of said lever, whereby the differential in the movement of said compensating drive will be in proportion to variations in the extent of movement of said part to effect the discharge of a given quantity of liquid, to insure accurate indication of measurement by said hands.

3. In a liquid measure indicator, an operating shaft, a dial provided with numbered gradations and having hands movably thereover, driving mechanism interposed between said shaft and hands including a compensating drive, a cam member rotatable by said driving mechanism and having a cam surface, a lever associated at
one end with said compensating drive and having its other end in engagement with the cam surface of said cam member, a spring for holding the latter end of said lever in engagement with such cam surface, means for adjusting said cam in either of two positions to effect, through said compensating drive, an advance or a retardation in the movement of said hands, and means for adjusting the fulcrum of said lever, whereby the differential in the movement of said compensating drive will be in proportion to variations in the extent of movement of said part to effect the discharge of a given quantity of liquid, to insure accurate indication of measurement by said hands.

4. In a liquid measure indicator, an operating shaft, a dial provided with numbered graduations and having hands movable thereover, driving mechanism interposed between said shaft and hands including a compensating drive, a cam member rotatable by said driving mechanism and having a cam surface terminating at either end, respectively, in a high and low point, a lever associated at one end with said compensating drive and having a free end in engagement with said cam surface, a spring for holding the latter end of said lever in such engagement, means for adjusting said cam member to bring either its high or its low point opposite the free end of said lever, whereby, in the movement of said cam member, said compensating drive will be controlled by said lever to advance or retard the movement of said hands according to the position of said cam member, and means for adjusting the fulcrum of said lever, whereby the differential in the movement of said compensating drive will be in proportion to variations in the extent of movement of said part to effect the discharge of a given quantity of liquid, to insure accurate indication of measurement by said hands.

5. In a liquid measure indicator, an operating shaft, a dial provided with numbered graduations and having hands movable thereover, driving mechanism interposed between said shaft and hands, a compensating drive included in said driving mechanism having a driven gear, a disk slidably connected with said gear and movable toward or from the same, an arbor associated with the driving mechanism and having one of said hands mounted thereon, a differential connection between said disk and arbor for driving the latter, a lever associated at one end with said disk and having a free end, a cam member rotatable by said driving mechanism and having a cam surface presenting a high and a low point, a spring normally holding the free end of said lever in engagement with said cam surface, means for adjusting said cam member to position its high or low point opposite the free end of said lever, whereby, in the rotation of said cam member, the free end of said lever will be actuated by said cam surface or by said spring to move said disk toward or from said gear, whereby to cause said differential connection to effect an advance or retardation of the movement of said arbor in accordance with the position of said cam, and means for adjusting the fulcrum of said lever, whereby the differential in the movement of said compensating drive will be in proportion to variations in the extent of movement of said part to effect the discharge of a given quantity of liquid, to insure accurate indication of measurement by said hands.

6. In a liquid measure indicator, an operating shaft, a dial provided with numbered graduations and having hands movable thereover, driving mechanism interposed between said shaft and hands, a compensating drive included in said driving mechanism and having a driven gear, fixed pins projecting outwardly from one side of said gear, a grooved disk slidably mounted on said pins, an arbor included in said driving mechanism and having one of said hands mounted thereon, pins projecting from opposite sides of said arbor, a pair of parallel arms projecting outwardly from opposite side edges of said disk and embracing a corresponding pin of said arbor, said pairs of arms being oppositely inclined with respect to each other, whereby, in the movement of said disk toward or from said gear, the movement of said arbor will be advanced or retarded, a lever associated at one end with said disk and having a free end, a cam member rotatable by said driving mechanism having a cam surface engaging the free end of said lever, a spring for holding said free end in engagement with said cam surface, means for adjusting said cam member in either of two positions to effect a movement of said disk toward or from said gear according to the position of said cam member, and means for adjusting the fulcrum of said lever, whereby the differential in the movement of said compensating drive will be in proportion to variations in the extent of movement of said part to effect the discharge of a given quantity of liquid, to insure accurate indication of measurement by said hands.

In testimony whereof, I have hereunto set my hand.

JOHN L. WHEELER.