March 22, 1932. J. M. DAYTON 1,850,128

AUDIBLE COUNTING AND COMPENSATING MECHANISM

Original Filed May 14, 1927 2 Sheets-Sheet 1

Fig. 1.

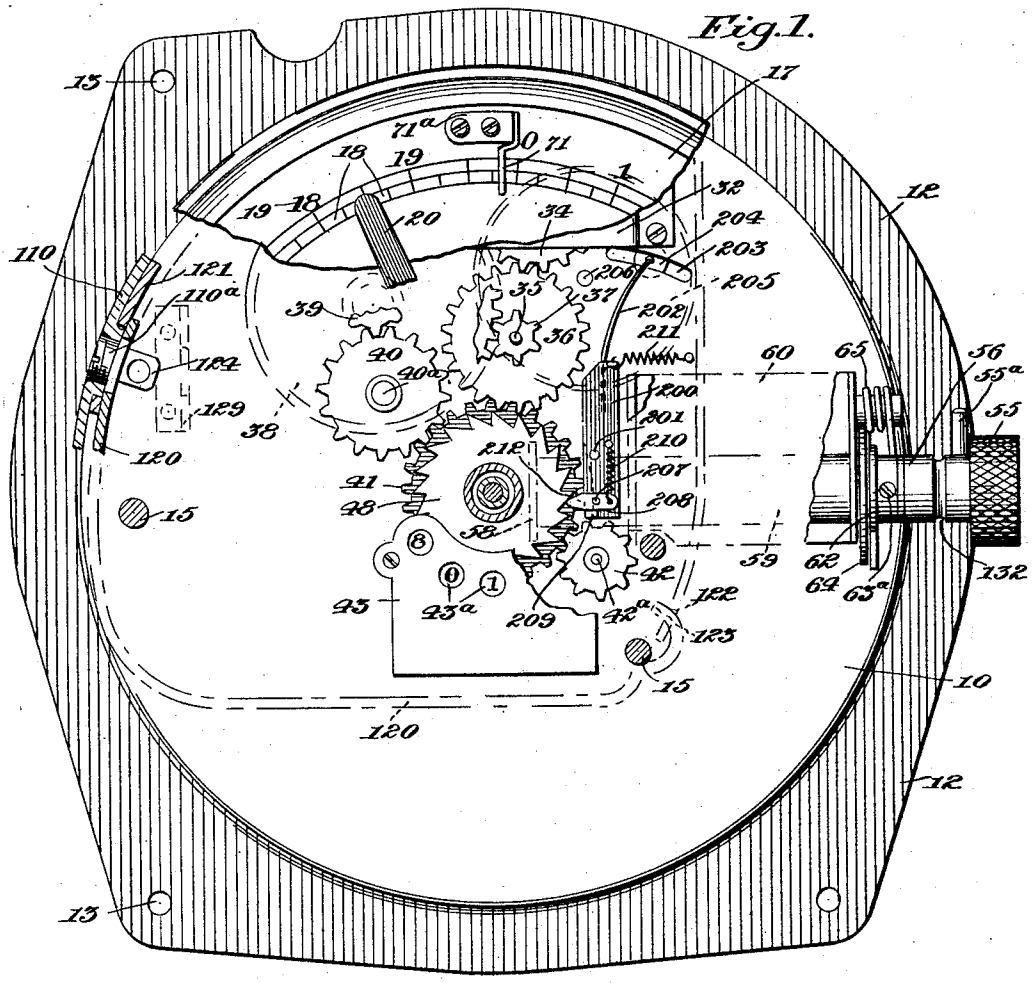
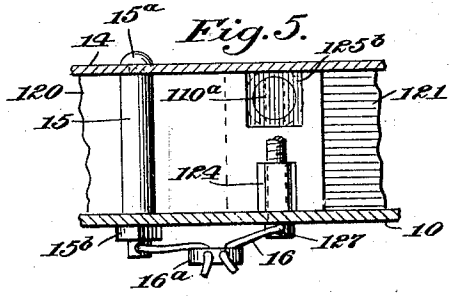


Fig. 5.



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AUDIBLE COUNTING AND COMPENSATING MECHANISM

Original Filed May 14, 1927 2 Sheets-Sheet 2

Fig. 2.

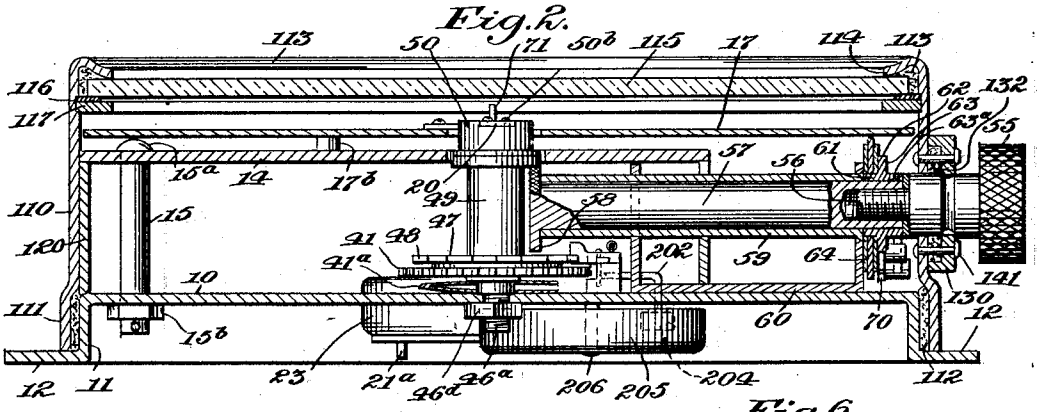


Fig. 3.

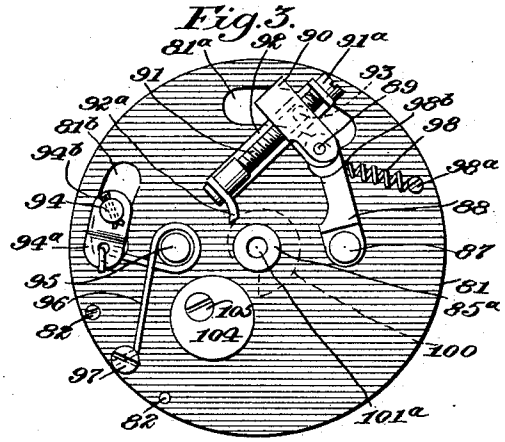


Fig. 6.

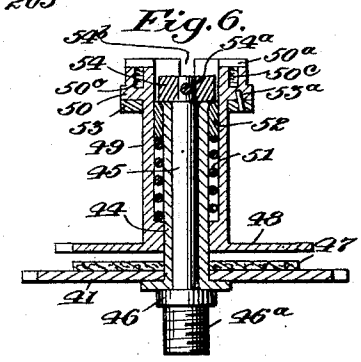


Fig. 7.

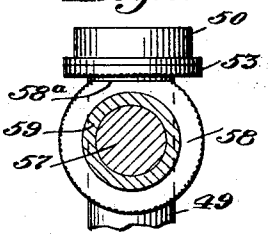


Fig. 4.

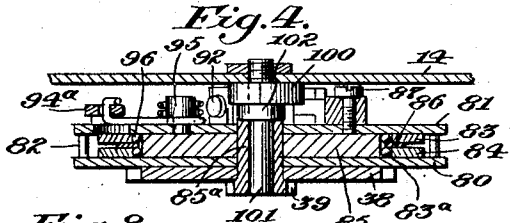


Fig. 9.

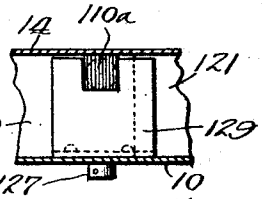
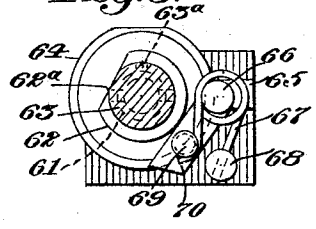


Fig. 8.



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UNITED STATES PATENT OFFICE

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AUDIBLE COUNTING AND COMPENSATING MECHANISM

Application filed May 14, 1927, Serial No. 191,368. Renewed February 2, 1932.

This invention relates to improvements in audible mechanisms for counting and for compensating constantly recurring errors in transmitting systems.

A compensating device of this type has already been disclosed by my application Serial No. 167,799, filed Feb. 12, 1927, on counting and compensating mechanism to which reference is made for certain features of a device of this type which are not fully disclosed herein. For ease of comparison, like reference numerals have been employed in the two applications. Such devices are more particularly intended for employment in compensating the movement of a dispensing pump piston as transmitted to and measured by a counting mechanism, as for example in the counting of the total number of gallons dispensed by a gasoline filling station pump: and in particular according to the present application, an audible indication is delivered at the completion of the delivery of each unit of volume, e. g., each gallon. It will be understood, however, that the invention is not limited to such employment but is described hereinafter by way of example in connection with such a dispensing pump, although it will find employment in many arts.

It is well known that reciprocating gasoline dispensing pumps employ cylinders and pistons made of drawn tubing, and in consequence of differences arising during the course of fabrication, such cylinders and their pistons are not all of the same diameter, whereby it becomes necessary to vary the effective stroke of the piston in order to produce the dispensing of a normal or standard quantity, as for example, one gallon. Since it is desirable to measure the dispensing not only of the full or unit quantity of one gallon with such a pump, but also the most minute fraction thereof, it has been found as pointed out in my aforesaid patent application, that it is necessary to employ some compensating or correcting device between the pump actuating device and the counting mechanism, whereby such differences may be compensated for, or corrected, and even the smallest fraction of a unit volume be totalized by the counting mechanism. If, for example, the owner of the pump should place it in charge of a custodian, it is desirable that the owner of the pump should have an accurate check upon the total number of gallons which have been dispensed therethrough, since this is a measure of the money which should be turned over by the custodian to the owner. It is found essential that the custodian should not be able to defraud either the customer or the owner by, on the one hand, dispensing the liquid without causing an actuation of the counting mechanism: and on the other hand, by making claim to the customer for a quantity of gasoline which has not been fully delivered to him. For such reason, it is essential that the pump should at all times be positively connected to the counting mechanism, and that the compensator should be of a type which will respond to even the smallest movement of the pump handle.

For this purpose and according to the present invention, a positive train of gears is employed to connect the pump shaft through a driver member with the counting mechanism: and a compensating device is included in this gear train to establish automatically, continuously and regularly the necessary correction for the variation of the particular pump cylinder from the normal or standard. To this end, the movements of the driver member in one direction are caused to be summed, while the movements of the driver member in the other direction are free and without effect upon the counting mechanism. In this way, the movement of the gear train is continuously in one direction, and no variation or error comes into existence by reason of back-lash in the gears, provided there either for constructional reasons of ease of movement or arising by reason of wear of the several parts. The compensating device included in this gear train comprises two members, one of which is driven positively from the driver member and the other of which is driven from the said first member of the compensator device, but with a constant excess or advance movement over the motion of the said first member arising by reason of its drive from said driver member. The compensating device is particularly character-

ized by reason of the fact that it moves continuously in rotation, and is therefore competent and required to establish such compensation or correction throughout the 360° of its rotation, and thereafter to reset for compensation through a further 360°, etc.

Further, in connection with this invention there is employed an indicating hand and an audible indicator whereby the customer is enabled to observe and hear the indication of the quantity of gasoline which is being delivered to him, and by reason of the employment of the compensating device in the driving train for such hand and indicator, the indications are calibrated and compensated so that a correct indication is given by the hand and audible indicator, regardless of the diameter or structures of the particular pump. Means are provided for resetting this hand to its initial or zero position, and these means are provided entirely independently of the connection of the counting mechanism through its train to the driver member, so that if the indicating hand be even in the process of the return movement when the pump is actuated, yet the totalizing counting mechanism will receive its due movement as a safeguard to the owner of the pump. Furthermore, during this return movement, the audible indicator is likewise severed from its relationship with the driver train, so that at all times the audible indicator operates to notify the customer in exact consonance and synchronism with the movement of the indicating hand. It is further provided that during the normal movement of the hand and the moving parts of the audible indicator in dispensing the liquid, these parts shall be free from engagement with the resetting mechanism, whereby the effort necessary for the actuation of the counting and indicating systems is reduced to a minimum: and on the other hand, the resetting mechanism is so disposed that during the operation of resetting, the hand and indicator and their associated parts are removed from substantial frictional engagement with the counting mechanism and its driving system, whereby the creation of back-lash or undesired movements in any member of this system, or a frictional contact with any member of this system for erroneous and wrongful operation, is rendered impossible.

As in my copending application, means are provided for enclosing and guarding the essential moving elements of the apparatus against water and dirt, so that they are protected from excessive wear and errors arising therefrom. A sealing system is further provided whereby the adjustments of the compensating elements are made accessible only to a properly authorized person, and it is possible to determine at all times whether any attempt has been made to modify the compensator.

The audible indicator according to the present invention is located on the exterior of the journal casing so that its noise is clearly perceptible to the customer: but at the same time the moving parts are all protected within the aforesaid seal.

As in my former application, the moving elements are counterbalanced so that no undesired operation of the driving train, the counting mechanism, and the indicators may be accomplished by aid of hammering upon the casing: and the various parts are assembled in units so far as possible.

The reset mechanism employed for the hand according to my copending application is employed in the present instance to reset the audible indicator, and this mechanism cannot be returned without completing a full stroke, so that it is impossible for the custodian of the pump to defraud a customer by leaving the indicating hand at a higher reading than the zero position at the beginning of a delivery or to leave the audible indicator elements in such position that the gong is sounded sooner than at the completion of the delivery of a full gallon. With these and other objects in view as will appear in the course of the following specification and claims, taken in conjunction with the accompanying drawings, there is shown in the latter an illustrative form of execution and application of this invention in its employment with a gasoline dispensing pump of any suitable type.

In these drawings:

Figure 1 is a face view of the device, with portions successively broken away for the clear representation of the cooperation of the elements.

Fig. 2 is a section substantially on a diametral plane through the staff and the reset shaft of the device according to Fig. 1.

Fig. 3 is a face view of the compensating mechanism.

Fig. 4 is a diametral section through the compensating mechanism in position on the deck plate.

Fig. 5 is a fragmentary section of a detail of the sealing structure.

Fig. 6 is a diametral section of the hand staff and friction clutch.

Fig. 7 is a view in section through the resetting shaft, showing the resetting cam and the cooperating parts of the hand staff and sleeve.

Fig. 8 is a further section through the resetting knob, showing the knob return mechanism and stop for the resetting mechanism.

Fig. 9 is a sectional view corresponding to Fig. 5, but showing the guard shield.

In these drawings, the counting device has the base 10 having the cylindrical section 11 and the outwardly extending flange 12. The flange 12 is provided with the holes 13 to permit securing this base plate to a suitable

support. The base plate portion 10 receives the elements of the transmitting train, the compensating mechanism, the counting mechanism, the dial and hand system, and the reset mechanism.

A deck plate 14 is held in parallel spaced relationship to the base plate 10 by means of the three pillars 15 which have reduced ends to pass through apertures in the deck plate and the base plate: the ends of these pillars extending through the deck plate 14 are upset to form the rivet heads 15*a*, so that the pillars are held immovably with regard to the deck plate, whereby an unauthorized person is unable to separate the deck plate 14 from the pillars 15. At the other end the pillars 15 extend through their respective apertures in the base plate 10 and are held by the nuts 15*b* as shown in Fig. 2. It will be understood that the length of the reduced portion of the pillars which extend through the base plate 10 is such that when a single nut 15*b* is locked in position as by a sealing wire 16 and the lead seal 16*a*, it is impossible to remove the other pillars from the base plate 10, and hence it is only possible to remove the deck plate by breaking the seal.

The dial 17 (Fig. 1) is preferably white and has indicia, including the index marks 18 and the numerals 19 arranged in a circle on its face. It has in the present instance been supposed that the device is intended for the measurement of gallons, for which indicia have been provided, up to and including 20. It will be noted that the main indices for unit gallons have been subdivided into halves and quarters. Playing over this dial and cooperating with the indices is the pointer or hand 20 which is secured to a central shaft and actuated in the manner to be described hereinafter. The dial 17 is mounted above and rigidly connected to the deck plate 14 by means of the screws which pass through the spacer collars 17*b* as shown in Fig. 2, whereby the dial, hand, deck plate, and base plate may be assembled and handled as a unit.

The gear train is driven in any suitable manner, for example, that shown in my copending application: whereby it will be understood that the gear 34 is driven as an idler to communicate the driving movement to the gear 36. This driving movement may, for example, be accomplished by the oscillation of a shaft by the pump handle while the pump is being actuated, so that the gear 34 follows exactly all movements of the pump: and an intermittent clutch 23 is provided in the driving train (Fig. 2) so that the movements of the driving element in one direction by means of the clutch cause the driving of the gear 34 in this direction and by a proportionate amount no matter how small may be the movement in such direction, while on the other hand, a movement of the driving member in the opposite direction is without effect upon the gear 34 which remains stationary during such reverse movement. It will be understood that by this means the delivering or the returning movement of the pump handle is caused to actuate the gear 34 in one direction and not in the other, so that the movements of the gear 34 represent the actual delivery from the pump. Such a driving train has been described and more completely illustrated in my copending application, and is not claimed herein except insofar as it constitutes a part of the driving system.

The strap 32 is fastened rigidly to the base plate 10 by suitable screws, and serves to support and guide certain of the shafts of the driving train, including the shaft of the idler gear 34. It will be understood that the ratios of numbers of teeth in the driving train is calculated so that the alternate drive of the indicating hand 20 and of the counting mechanism to be hereinafter described, as well as the audible indicator, are proportionate to the movements of the pump. The method of accomplishing this has been indicated in my copending application, and is generally within the ability of a mechanic.

A further spindle 35 is fixedly mounted on the base plate 10 and extends upwardly therefrom to support the gear 36 which is in mesh with the idler 34. The gear 36 is fixedly connected with a driving pinion 37 on its own spindle. This driving pinion 37 in turn is in mesh with the driver plate gear 38 of the compensating device, as shown in Figs. 3 and 4, and which will be described more fully hereinafter. The compensating mechanism delivers its movement to a corrector plate pinion 39 which is likewise indicated in dotted lines in Fig. 1. This pinion 39 is in mesh with an idler gear 40 which is carried on a spindle 40*a* fixed in the base plate 10, and in turn is in mesh with the foot gear 41 of the hand-staff; and the foot gear 41 is in turn in driving relationship with the first gear 42 of the counting train. This counting gear is mounted directly on a shaft 42*a* which is pivoted preferably in the plates 43 of the counting mechanism. The shaft 42*a* carries the dial which has the successive indicia thereon which display through the respective openings 43*a* of the upper plate 43, so that the total number of gallons delivered may be read from the indications beneath the respective windows 43*a*. It will be understood that any appropriate type of transfer mechanism may be employed to transmit a full rotation of the shaft 42*a* as a one-tenth rotation of the succeeding shaft, etc., whereby the counting mechanism is actuated. Such devices are very old and well known in the art, and the specific assembly forms no portion of this invention, and need not be more fully described

herein. The counting mechanism is fastened by its plates 43 in some suitable manner to the base 10 so as to be held in fixed position thereon.

The foot gear 41 is rigidly secured as by peening to a sleeve 44 (Fig. 6) which is journaled for loose rotation on the steel spindle 45 which has a spacer collar 46 and a threaded portion 46*a* at its rear end for engagement in the base plate 10. A suitable nut 46*d* (Fig. 2) is employed to lock this spindle 45 in its position. A leather friction disk 47 is placed loosely about the sleeve 44 and upon the front face of the foot gear 41. A counter friction plate 48 is secured to the hand sleeve 49 in any suitable manner, so that it is held parallel to the foot gear 41. The hand sleeve 49 extends away from the base plate 10 and has an enlarged head 50 at its front end having a transverse seat 50*a* slightly recessed therein to receive the indicator hand 20, which is held in such position by screws 50*b* passing into the screw holes 50*c*. The rear portion of the hand sleeve 49 is formed internally for a close journal bearing about the sleeve 44, but for the greater part of its length is bored out internally to a greater diameter to receive the coil spring 51, which at its rear end reacts against the shoulder formed by this greater bore. A bushing 52 is inserted between the hand sleeve 49 and the inner sleeve 44 and substantially fills this space, while affording the hand sleeve 49 a front bearing for its rotational movement with respect to the inner sleeve 44. It is preferred to internally chamfer the bushing 52 and to upset the front end of the inner sleeve 44, whereby the sleeve 44 and the bushing 52 are held solidly together and form the front reacting member for the coil spring 51, which thus is contained within an annular cavity formed by the integral hand sleeve 49 and the solidly connected inner sleeve 44 and its bushing 52. A knurled ring 53 having rearwardly directed knurls is secured to the bottom of an outwardly extending shoulder of the head 50, and is held in such position and against rotation with respect to this head 50 by means of pins 53*a*. An annular stop bushing 54 is seated about the front end of the steel spindle 45, and is locked thereto by a transverse pin 54*a* which is passed through the pin slot 54*b* of the head 50, so that the pin 54*a* may be passed through the head 50 and the latter have a relative axial movement with respect to the spindle 45 and the sleeve 44. It will thus be seen that the foot gear, friction leather disc, the two sleeves, the front bushing 52, and the knurled ring 53 are assembled as a unit, and when the friction plate is moved toward the front, they rest freely between the collar 46 and the bushing 54 the collar 46 of the spindle 45, so that no strain is placed upon this spindle, and even the driving strain of the meshing gears occurs very close to the base plate 10, and therefore has but very slight tendency to distort or move the spindle 45. Since the spring 51 reacts between the fixed sleeve 52 against the friction plate 48 and leather 47, and against the foot gear 41 which in turn is rigidly secured in fixed relationship to the sleeve 52, it is apparent that no great strain exists from this unit upon the stop bushing 54, when the spring is expanded to hold the plate 48 against the leather 47, and the spindle is not under great strain, and imposes no undue friction upon the driving train while counting and indicating is occurring. A flat spring 41*a* exerts a constant drag on the gears and prevents the development of back lash by hammering the device.

The reset mechanism for restoring the hand 20 from its actuated position to the zero position includes the knob 55 which projects to the exterior of the casing, and is mounted on a threaded stub 56 which is in threaded relationship with the spindle 57 which in turn carries at its inner end the reset disk 58 (Fig. 7), which is knurled on its periphery and has a flattened portion 58*a* at the portion which is opposite the knurled ring 53 on the hand staff, so that this knurled ring, when the reset mechanism is in its inoperative position, is free of the knurled ring 53, and the latter is enabled to turn without any friction being placed upon it from the resetting mechanism. As soon as the knurled disk 58 is rotated by means of the knob 55 and the shaft 57, the flattened portion is removed from opposite the knurled ring 53, and the circular portion of the disk 58 is brought into engagement with the ring 53, whereby the latter is forced toward the front, and in turn raises the hand sleeve 49 against the action of the coil spring 51, and thereby disengages the friction plate 48 from the leather 47, so that very little or no frictional resistance is offered by the foot gear 41 to the free movement of the hand sleeve 49. As the friction plate 48 is moved away from the foot gear 41, the front end of the sleeve 44 and its bushing 52 are brought into contact with the stop bushing 54 on the spindle 45, whereby a slight friction is provided, and at the same time the parts are prevented from separating. After the knurled disk 58 has completed a full revolution, the flattened portion 58*a* again comes opposite the knurled ring 53, and the latter is moved toward the rear so that the friction plate 48 is again brought into contact with the leather 47 and thus with the foot gear 41, for frictional driving as before: and likewise the knurled ring 53 is finally left free of the knurled disk 58, so that again no frictional relationship exists between the two.

The spindle 57 is guided in a sleeve 59 of a stirrup 60 fixed to the base plate 10.

A non-return device is provided for the spindle 57 to prevent a reverse movement thereof and to require its full revolution when

once actuated, so that a complete resetting of the hand 20 and the toothed foot plate 48 will occur. This non-return device comprises an intermittent clutch having a core 61 with a clutch plate 64 engaged thereon with suitable spacing collars to hold the balls and springs of the clutch plate in position, as shown in Fig. 2 and fully described in my copending application. The core 61 has a flange 62 with a flat 62*a* thereon to cooperate with a blocking dog 70 having an actuating spring 67 which is looped about the upstanding pivot pin 66 of the dog and engages its ends against pins 69 on the dog and 68 on the strap 60. A screw 63*a* holds the core 61 fixed to the spindle 57: while a pad 65 holds the clutch plate 64 against rotation.

The compensating mechanism is constructed as follows: a driver plate 80 and a corrector plate 81 are held fixedly in spaced relationship with regard to each other by spacer pillars 82 and screws passing therethrough. Located between these corrector plates are two corrector clutch rings 83 and 84, which are formed with circular central apertures with notches offset therein to receive the clutch balls 83*a* which cooperate with springs to force the balls into wedging relationship between the respective plates 83, 84 and the central core 85. The notches on each of the plates 83, 84 are directed similarly, so that one of these clutch plates with its balls and springs will move relatively to the clutch core while the other holds it, and vice versa. These rings 83, 84 have been made large in order to reduce the minimum registrable quantity. It has been found in practice that a .01 of an inch movement in the inner periphery of one of these compensator clutch rings is necessary to secure an easy operation of the clutch and an actuation of the corresponding amount throughout the mechanism, and this represents a very minute percentage of a usual delivery. The driver plate gear 38 is secured to the driver plate 80 for movement therewith at all times. A clutch core 85 of hardened steel is mounted coaxially with the driver and corrector plates for movement with relation thereto, and extends through the two corrector clutch rings 83, 84 and comes approximately to the inner face of the driver plate. A spacing ring 86 is located between the two corrector clutch rings for the purpose of keeping the balls 83*a* and their associated springs within the notches of the respective rings 83, 84.

Mounted on the upper face of the corrector plate is a pivot 87 for the guide link 88. This guide link is connected by a pivot 89 to the adjustable or traveller nut 90 which is mounted on the adjuster screw 91. This adjuster screw 91 is freely rotatable in the corrector lever 92 which has upstanding ends to form journal bearings for the screw 91. The screw 91 has a head 91*a* at its end adjacent the periphery of the corrector plate 81. The corrector plate 81 is provided with two slots 81*a* and 81*b* through its face. The pivot pin 93 of the corrector lever 92 is fixedly mounted in the upper clutch ring 83, which likewise has the post 94 upstanding therefrom through the aperture 81*b*, with a reduced stop at its upper end to receive the link 94*a* which is held thereon by a pin 94*b*. A post 95 secured to the corrector plate 81 serves as a guide for the helical portion of a take-up spring 96, one arm of which engages in an aperture in the free end of the link 94*a* and the other end of which is secured beneath a reaction screw 97 which holds it fixedly to the corrector plate. This take-up spring tends at all times to pull the clutch ring 83 counterclockwise with regard to the corrector plate 81, and thus imposes a constant take-up upon the entire system, and prevents any back-lash occurring at the beginning or ending of the registering movements. A toggle break spring 98 may be connected by a post 98*a* on the corrector plate 81, and a screw 98*b* on the guide link 88; but this is not essential and is only employed in cases where the adjustment of the traveling nut 90 along the screw 91 may bring it to a position whereby, during the movement of the corrector lever 92, the centers of the pivots 93, 89 and 87 may extend in a straight line.

On the lower side of the deck plate 14 is provided a cam 100 which is substantially of constant and equal rise. A post 101 extends downwardly from the deck plate through this cam and through a spacer 102, and passes through a post hole 101*a* through the corrector to the compensating mechanism. The axially directed end of the corrector lever 92 is provided with a cam dog 92*a* which rests against the periphery of the cam 100. It will be understood that as the corrector plate 81 is rotated about the axis of the post 101, the cam dog is forced outwardly by this cam 100, whereby the corrector lever 92 is caused to rock about pivots 89 and 87 in a compound motion, and its own pivot center 93 and the corrector clutch ring 83 is caused to move slightly clockwise in the position of Fig. 3. The cam 100 has been shown in dotted lines in this figure, and it is seen that this clockwise excess rotation of the corrector clutch ring 83 is accomplished during a clockwise rotation of the corrector plate 81 itself. During this movement, the take-up spring 96 yields slightly, but at all times prevents any slackness or back-lash between the respective members; and at the moment that the cam dog 92*a* slips down the radial portion of the cam 100, the take-up spring 96 immedately snaps or jerks the corrector clutch ring 83 back to its original position with respect to the corrector plate 81.

It will be understood that during the relative clockwise advance of the corrector

clutch ring 83 with regard to the corrector plate 81, the clutch ring with its balls and springs is tightly engaging the clutch core and rotating the same. Since this clutch core is engaged by the corrector clutch ring 83, it is caused to rotate for a slightly greater angular distance than the actual distance covered by the corrector plate 81 and its coupled driver plate 80 under actuation from the pump handle. The moment, however, that the cam dog slips down the radial face of the cam 100, the corrector clutch ring 83 loses its engagement with the clutch core, by reason of its reversal of movement and the disengagement of the balls and springs, and the corrector clutch ring 83 slips back, as noted, without effective operation of any kind, and under the impulse of the take-up spring 96.

It will be seen that the amount of the relative advance of the corrector clutch ring 83 with respect to the corrector plate 81 is uniform throughout a rotation of the corrector plate 81, since the cam 100 is of constant and uniform rise. It will further be seen that the actual amount of this advance during a single revolution depends upon the ratio of the lever arms from the engaging point of the cam dog 92*a* to the effective center of the traveling nut 90, in proportion to the distance from the effective center of the traveling nut 90 to the pivot 93. It will be understood that the effective center of the traveling nut 90 depends upon the sizes and separations of the respective members, including the traveling nut 90, the pivot 89, the guide link 88 and the pivot 87. Since the sizes of these members are fixed in the original construction, it is apparent that by a variation of the position of the traveling nut 90 along the threaded spindle or screw 91, the lever ratio may be modified, and in particular that as the traveling nut 90 comes closer to the cam dog 92*a*, a greater and greater angular distance of movement is afforded to the corrector clutch ring 83, and that on the contrary, as the traveling nut 90 departs from the dog 92*a*, the relative-movement of the corrector clutch ring 83 becomes less and less until finally, when the effective center of movement of the traveling nut 90 is coincident with the axis 93, the corrector clutch ring 83 and the corrector plate 81 are rotated by the same amount.

The second clutch ring 84 is provided with its balls and springs directed in the same direction as the corrector clutch ring 83, and is pinned to the driver plate 80 so as to move therewith. During the quick return movement of the corrector clutch ring 83, when the clutch core is disengaged therefrom, the corrector clutch ring 84 with its own balls and springs lock with regard to the clutch core, and prevent any return movement thereof, thus maintaining the excess or advance movement of the clutch core with regard to the corrector and driver plates.

Since a fraudulent operation of the device might possibly be attained by jogging or knocking it with the hand or a hammer handle, it is preferred to employ a counterweight 104 which is fastened by a screw 105 disposed eccentrically in its mass to the corrector plate 81. The unbalanced mass of the corrector mechanism including the corrector lever 92, the traveling nut 90, and the guide link 88 and other members, is compensated by balancing the compensating mechanism about its axis by slipping the counterweight 104 around beneath its screw 105 when the latter is slightly loose. The counterweight is then tightened into position, and it is no longer possible to secure a fraudulent change of the mechanism by jarring.

The clutch core 85 is provided with a tubular sleeve 85*a* which passes through the driver plate 80 and its driver plate gear 38 and is provided with the pinion 39 which is fixed to this sleeve 85*a* in some suitable manner, as by peening.

It will be seen that the driver and corrector plates and the mechanism attached thereto are held fixedly together, so that all these elements may be inserted and removed as a unit, which is generally indicated in Fig. 1 of the drawings by the dotted lines representing the peripheries of the gear 38, and the pinion 39.

In order to enclose and contain these pieces of mechanism, a casing is provided around the whole. It is preferred to form the base plate 10 by stamping from sheet material such as steel, whereby to form the setting flange 12, the barrel flange 11 and the base plate proper 10. The casing 110 is likewise preferably formed of sheet material formation, into shape to have a slight outward enlargement 111 at the base adjacent the barrel flange 11, so that the cork packing ring 112 may be cemented into position in this enlargement, so that when the casing 110 is seated upon the barrel flange 11, a dust and water-tight joint is formed. At the other end the casing 110 is provided with a protective rolled bead 113 which terminates with an inward flange 114 which serves as a seat for the glass pane 115. In assembling the device, putty is placed in the bead 113 and the glass pane 115 is placed into position and forced home until the putty is extruded around the edges of the pane of glass, as shown, whereby a resilient and tight seating is provided for the pane of glass, and all entry of dust and water into the casing at this point is prevented. The putty is then scraped away substantially flush with the glass pane 115, and a small felt ring 116 is placed in position at the periphery of the glass, and held in position by a split metal ring 117: this felt ring and the split ring

being received within a shallow groove in the casing 110. It will thus be seen that the glass pane and casing constitute a further unit which is inherently water and dust-tight, and is packed with regard to the base plate 10 to form a water and dust-tight connection at this point. Likewise, all holes in the base plate are filled by their respective pivot or screw posts, so that it is not possible for dust or water to enter the casing, and thus interfere with the operation of the counting and compesating mechanism.

The point of entry of the knob stud 55 through the casing 110 is protected by a gland 130 which is held for self-alinement by pins 141 passing through the casing 110: while a water groove 132 is formed on the stub itself.

It has already been shown and described how the deck plate 14 and the base plate 10 are held against separation without breakage of a sealing device 16, 16*a*, In order further to protect the mechanism from fraudulent readjustment, the gap between the deck plate 14 and the cover plate 10 is closed by the two bands 120 and 121 (Figs. 1 and 5). The band 121 is provided with an eye 122 which receives the hook 123 on the band 120, so that these members are locked together against separation. At its other end the guard band 121 is provided at one edge with an adjusting hole and at its other edge with a lock lug 124. The other strap, 120, is provided at its other end with an adjusting hole, and with a notch for the lock lug 124. An aperture is provided in the base plate 10 and is in line with the threaded hole in the lock lug 124 when the guard bands 120, 121 are in position, as shown in Fig. 5: and a sealing screw 127 may be passed through the aperture of the base plate 10 and into the threaded hole of the lug 124 and a wire 16 for passing through the head of the screw 127 and through the pillar 15 beneath the lock nut 15*b*, so that the two bands are held immovably in position. In such position, the adjusting holes are alined; and further more a downwardly extending adjustment shield 129 is secured to the deck plate 14 and has itself an adjusting hole, which is in alinement with the adjusting holes in the bands 120, 121 under the conditions specified. Further, the cam 100 is so disposed with regard to the direction of its radial portion that when the cam dog 92*a* of the correcting lever 92 has just slipped down the radial face of this cam 100, the head 91*a* on the adjuster screw 91 is presented in alinement with the several adjusting holes. Only under these conditions may a screw-driver be introduced through these holes to gain access to the adjusting mechanism for changing the same: and at all other points the mechanism is protected against accidental or intentional change by the aforesaid associated relationship of the base and deck plates, and by means of the bands 120, 121. In order further to prevent the adjustment or readjustment of the adjuster screws 91 without first having broken the seal 16, 16*a*, the parts are so arranged that the sealing screw 127 may be threaded fully upward through the base plate 10, and the lug 124, whereby its upper end comes opposite the adjusting holes 125*b*, and blocks the same. It will be noted in Fig. 5 that the sealing wire 16 passes through the head of the sealing screw 127, as well as through the pillar 15: whereby a positive assurance is afforded against unauthorized modification of the compensating system. A hole in the casing for the purpose of adjustment is normally closed by the threaded plug 110*a* whose head fits a recess in the casing 110.

The audible indicator is actuated from the counter friction plate 48 which for this purpose is formed at its periphery with twenty teeth, corresponding to the 20 gallons of maximum indication by the hand 20 on the dial 17. A rocker 200 is pivoted on a pin 201, fixed to the base plate 10, and carries at the upper end in Fig. 1 a spring arm 202 which is bent at its top and passes downward through an arcuate slot 203 in the base plate 10 and carries beneath this base plate and within the cup formed by its recessing with regard to the flange 12, a clapper 204. A gong 205 is fastened by a post 206 to the base plate 10, and covers the slot 203 against the insertion of a pin or other device which might fraudulently be employed. It will be noted that the rocker 200 and its spring arm 202 are contained within the sealing bands 120, 121.

At its other end the rocker 200 is provided with a pivot 207 for a dog 208 which presents one end in the path of the teeth on the friction plate 48, and which is prevented from counterclockwise movement by these teeth by an upstanding lug 209 on the rocker 200. A return spring 210 is connected to the other end of the dog and to the rocker 200 to hold the dog against the lug 209 at all times. A spring 211 is connected between the upper end of the rocker 200 and the base plate 10 and tends at all times to move the rocker 200 in a clockwise direction.

The method of operation of this device is as follows:

When the pump is actuated, the actuating handle shaft (not shown) in known manner causes the movement of the driver member 21*a* and through the double clutch 23 a movement of the gear 34. This occurs in one direction of drive only, for example in a clockwise direction in Fig. 1. On the contrary, when the handle shaft returns, it moves freely with the driver member 21*a* without an actuation of the gear 34, as has already been described above. This movement of the idler gear 34 is transmitted to the driver plate gear 38, which being posi-

tively connected to the driver and corrector plates 80, 81, causes these plates to move in rotation in a clockwise direction, and by an angular amount which is in exact proportion to the movement of the pump handle. The gears of the train move always in the same direction, and by the provision of the retaining clutch 23, there is no slack or backlash in this gear train, so that even the most minute movement is summed up. As the corrector plate 81 rotates about the post 101, the corrector lever 92 presents its cam dog 92*a* against the cam 100 on the deck plate 14, and as the corrector plate moves clockwise in the position of Fig. 3, this dog 92*a* is forced successively and uniformly outward by the cam 100. As the lever 92 rocks, it turns about a virtual axis which is determined by the prevailing position of the traveling nut 90, as guided by the link 88 with regard to the pivot 87.

In an actual device which has been constructed and tested, the normal ratio of drive from the driving member to the compensator involved a movement of about 2.625 revolutions for one gallon as the theoretically exact angular distance of rotation for correct totalizing registration: and in the device itself, the initial gear ratio without any compensation was 2.685, or a loss of about 2% in the angular distance of rotation. This was compensated for or corrected by giving the clutch ring 83 a corresponding excess or advance movement with regard to the corrector plate 81 corresponding to this 2% loss. In the actual device, this placed the traveling nut 90 about midway of the adjuster screw 91, whereby it was possible with this single device to correct for pumps which were as much as 2% above or below the standard or normal. By a suitable low pitch of the adjuster screw 91, this compensation may be made as accurate as required.

As the clutch plate 83 is moved forwardly with regard to the plate 81, it drives the clutch core 85 by the amount of its own angular movement, so that his clutch core 85 moves faster in rotation than the driver gear 38, and hence the pinon 39 moves at a greater angular speed: and the amount of this increase in angular speed is determined by the position of the traveling nut 90 on the spindle 91, as heretofore described.

The gear trains and individual gears are calculated according to the direction of movement of the pump handle which is to be totalized, and according to the ratio of movement of the pump handle with regard to the indicating hand and totalizer: changes of the gears 34, 36, 37, 38 and 39, will permit the registration of volumes by gallons or litres or any other unit with a gong rachet and counting mechanism. If it be desired to change the number of figures on the indicating dial, a suitable change may be made in the ratios of the gears 41 and 42 for example.

As soon as the cam dog 92*a* has reached the outermost point of the cam 100, the clutch ring 83 has been advanced for its maximum angular excess movement with respect to the driver and corrector plates 80, 81. A moment later, the cam dog moves down the radial face of the cam 100, and the clutch ring 83 moves backward under the impulse of the take-up spring 96. The clutch ring moves free of the clutch core, and this return occupies substantially no time. Hence there is no actuation of the clutch core 85 in either direction during the period, and a further safeguard is afforded against such undesired action by the retaining clutch ring 84 which holds the clutch core 85 in fixed relation to the driver and corrector plates for this instant. As soon as the dog 92*a* has again made contact with the cam 100, this time at its minimum diameter, and a further rotation of the corrector plate 81 occurs, the lever 91 is forced outwardly as before and causes a renewed precession of the clutch ring 83 with respect to the corrector plate 81.

The counting mechansm and its dials have been advanced until for example nineteen units have been added to its indications: and likewise the indicating hand 20 has moved until it points to the index "19". During the course of this movement of the indicating hand, the teeth of the friction plate 48 have nineteen times forced downward and toward the right against the dog 208, and caused the rocker 200 to move counterclockwise until the tooth passed the dog 208. As soon as the dog escaped from the respective tooth, the rocker 200 was drawn back again in a clockwise direction by the spring 211 and its clapper 204 was drawn by inertia into contact with the gong 205 and produced a single stroke for the respective tooth, with a total of nineteen strokes in all. In the position shown in Fig. 1, the hand 20 has completed a movement to indicate eighteen and one-half gallons, and the tooth 212 of the friction plate 48 is shown as having forced the dog 208 to move the rocker 200 by about half of its movement. It will be understood that at the extreme left hand position of the dog 208, the clapper 204 is held slightly away from the gong 205: and that this extreme clockwise movement of the rocker 200 is limited by the engagement of the upper end of the rocker with the left hand end of the stirrup plate 60.

The customer having received the desired quantity of gasoline, the custodian of the pump may now reset the hand 20 by rotating the knob 55. Once this knob has been started in rotation, it is prevented from any return by reason of the clutch ring 64: and further, by reason of the fact that the disk 58 has moved the hand sleeve and parts away from the foot gear 41, it is necessary that the knob

55 be turned for a complete revolution before the gong and its clapper will again indicate the number of gallons to be delivered to the next customer. The custodian therefore is unable to cheat the customer by fraudulently advancing the gong ratchet without delivery of gasoline, or by failing to reset the ratchet entirely to zero. During the return movement of the hand 20, and the gong ratchet, the sleeve 49 and friction plate 48 have been moved to the front and returned, but during this movement the ratchet teeth on the friction plate 48 have caused the dog 208 to rock successively and for each of them in a clockwise direction about its pivot 207 and against its spring 210, so that there is no actuation of the rocker 200 during the return or resetting of the hand 20. It will likewise be seen that the friction plate 48 and its teeth are assembled in permanent relationship with the hand 20, so that if the hand 20 passes a unit indication on the dial 17, a stroke is sounded on the gong 205: and that the friction plate 48 and its teeth must be returned to zero in order to complete the operation of the knob 55, so as to restore the parts into the control by the drive train. If this be not done the customer immediately perceives that something is wrong, since neither the indicating hand 20 gives him an indication of the delivery nor does the gong sound to indicate the even gallons.

The stop 71 which limits the return movement of the hand 20 in resetting is supported by a foot 71*a* screwed to the dial 17, and itself projects above the path of the hand 20 and out of engagement therewith while the hand is normally moved with the friction plate 48 in its lower position, but being in stop relationship with this hand during its return path in a higher plane as a result of the raising of the sleeve 49 of the plate 48. This has been described in my copending application, and is referred to only as indicating that there is a positive stop for the hand 20 and its associated elements upon resetting, and at the same time no drag is given to the hand during its normal movement, so that twenty-one or twenty-two gallons may be delivered if the pump be of such capacity, without any greater friction upon the hand at the "20" indication than at any other.

The device may be mounted upon a dispensing pump, for example, by means of screws passing through aperture 13 of the flange 12.

It will be understood that throughout this description and in the accompanying claims the expression "gear train" is used broadly to designate a transmitting means between the driver member and indicating or counting mechanism, into which the compensator may be inserted for correcting the ratios of rotative movement under the successive impulses from the driver member.

It is apparent that the invention is not limited solely to the application or construction illustrated and described, but that it may be modified in many ways within the scope of the appended claims.

I claim:

1. In a device of the character described, including a reciprocating piston pump having a limited volume of delivery at each stroke and an oscillatable shaft connected to move with the pump piston, the combination of a gong, a gong sounding device, an intermittent movement clutch connected to said shaft, and a gear train driven always in the same direction by said shaft through said clutch for moving said sounding device, said train including a compensating mechanism for causing said sounding device to be moved faster than the driving ratio of said train proper between said clutch and said sounding device.

2. In a device of the character described, including a reciprocating piston pump having a limited volume of delivery at each stroke and an oscillatable shaft connected to move with the pump piston, the combination of a gong, a gong sounding device, an intermittent movement clutch connected to said shaft, and a gear train driven always in the same direction by said shaft through said clutch for moving said sounding device, said train including a compensating mechanism for varying the ratio of transmission from said clutch to said sounding device by a regulatable fraction thereof.

3. In a device of the character described, including a reciprocating piston pump having a limited volume of delivery at each stroke and an oscillatable shaft connected to move with the pump piston, the combination of a gong, a gong sounding device, an intermittent movement clutch connected to said shaft, and a gear train driven always in the same direction by said shaft through said clutch for moving said sounding device, said train including a compensating mechanism comprising two coaxial and relatively rotatable gears included in said gear train, a fixed cam, and means carried by one of said gears and cooperating with said cam and said other gear to cause a relative advance of said other gear with respect to said first gear.

4. In a device of the character described, including a reciprocating piston pump having a limited volume of delivery at each stroke in an oscillatable shaft connected to move with the pump piston, the combination of a gong, a gong sounding device, an intermittent movement clutch connected to said shaft, and a gear train driven always in the same direction by said shaft through said clutch for moving said sounding device, said train including a member having a friction surface, a ratchet wheel adapted to engage said surface to be driven thereby when in one

position and when in another position to be free therefrom, said gong sounding device cooperating with said ratchet whereby to sound the gong once for each tooth of said ratchet during movement of the ratchet when driven by said member, and permitting the ratchet to return freely without sounding of the gong in the opposite direction of movement, spring means to move said ratchet in said other direction to a zero position, and a resetting mechanism for separating said ratchet from said friction surface whereby to permit the ratchet to be returned to the zero position and thereafter operating to restore said ratchet wheel to engagement with said member.

5. In a device of the character described, including a reciprocating piston pump having a limited volume of delivery at each stroke and an oscillatable shaft connected to move with the pump piston, the combination of a gong, a gong sounding device, an intermittent movement clutch connected to said shaft, and a gear train driven always in the same direction by said shaft through said clutch for moving said sounding device, said train including a driving member and a ratchet wheel adapted to engage said member to be driven thereby when in one position and to be free of said member when in another position, said ratchet wheel actuating said sounding device once for each tooth of said ratchet, means to return the ratchet wheel into a zero position when disengaged from said member, a stop to limit the restoring movement of said returning means upon said ratchet, and a resetting mechanism to separate said ratchet from said member and thereafter to impart to said ratchet an energization in excess of that required to restore said ratchet to its initial position, said resetting mechanism including a slip device whereby the excess movement of said resetting mechanism beyond that required to bring said operating means to said stop is absorbed.

6. In a device of the character described, the combination of a base plate, a driver member, a gong, a gong sounding mechanism, means to transmit the movement of said driver member to said mechanism, said transmitting means including an adjustable compensator to correct the movement of said mechanism with respect to the movement of said driver member, a guard surrounding said compensator, and means to seal said guard to said base plate, said transmitting means and said compensator being located within said guard.

7. In a device of the character described, including a reciprocating piston pump having a limited volume of delivery at each stroke in an oscillatable shaft connected to move with the pump piston, the combination of a gong, a gong sounding device, an intermittent movement clutch connected to said shaft, and a gear train driven always in the same direction by said shaft through said clutch for moving said sounding device, said train including two relatively movable members, one of said members being driven by said shaft and the other said member being connected for driving said sounding device, means to advance said other member in precession of said first member, and a take-up spring acting relatively between said members whereby to absorb the slack in said train.

8. In a signal device for liquid dispensing pumps which vary one from another by diameter of cylinder and in length of stroke for delivery of a standard volume, a gong, a sounding device for said gong, a gear train driven with said pump, and a compensating device connected to said gear train and including adjustment means whereby the movement of the final element of said train may be varied by a desired fraction of the movement ratio determined by said train, so that the device may be sounded at the delivery of integral units of volume by any of said pumps to which it may be connected and adjusted.

9. In a signal device for liquid dispensing pumps which vary one from another by diameter of cylinder and in length of stroke for delivery of a standard volume, a gong, a ratchet wheel, a sounding device for said gong actuated by said ratchet wheel once for every tooth thereof, a gear train driven with said pump and including a compensator having an adjustment means whereby said ratchet wheel is advanced by one tooth for the delivery of a unit volume by one of said pumps, said compensator modifying the movement of said train at a ratio according to said adjustment which corresponds to the variation of the particular pump from standard.

10. In a device of the character described, the combination of a member adapted to be connected to any one of a series of devices which may move by different distances for the indication of a calibrated quantity, a gong, means to strike said gong, and means connecting said member and said striking means and including an adjustable compensating train so that said gong striking means may be actuated at intervals corresponding to predetermined different fractions of said calibrated quantity regardless of the amount of movement of said member engenderad by the particular device to which it is then coupled.

In testimony whereof, I affix my signature.

JAMES M. DAYTON.