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CONTROL FOR FLUID PUMPING AND DISPENSING MACHINES

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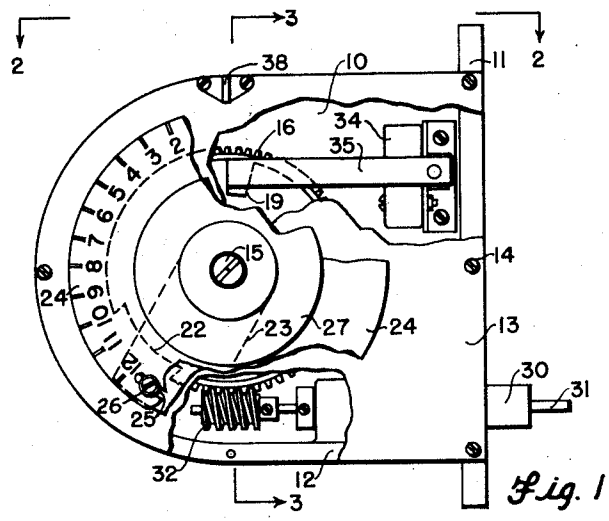


Fig. 1

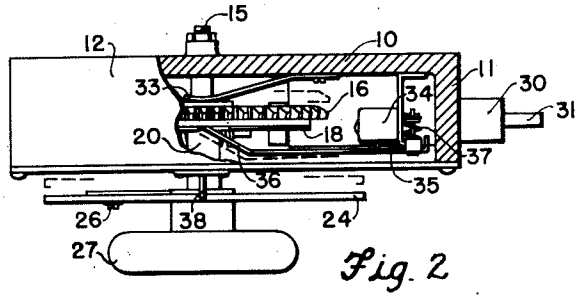


Fig. 2

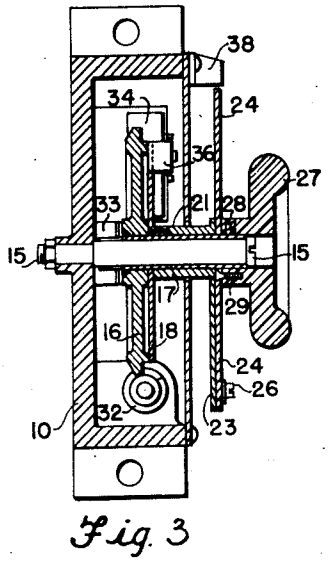


Fig. 3

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CONTROL FOR FLUID PUMPING AND DISPENSING MACHINES

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6 Claims. (Cl. 200—56)

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This invention relates to a meter control and more particularly to a control for fluid pumping and dispensing machines which control may be prearranged and pre-set to discontinue the operation of the machine after delivery of the pre-set unit of fluid.

Gasoline service stations are continuously called upon to supply automobiles with varying quantities of gasoline, and the large majority of the automobile drivers order in quantities less than a full tank, such as five or ten gallons. Delivery of the gasoline from the pump into the automobile tank through the conventional hose and manually operated nozzle takes several minutes during which time the station attendant must remain at the nozzle in order to stop the pump at the desired quantity. Obviously this time element is very important in terms of both station overhead and customer relationship and it is highly desirable that the attendant be relieved from continuous watch at the gasoline nozzle in order to complete the other services, such as checking the oil and cleaning the windshield.

There are devices in the prior art which control the delivery of gasoline from the pump but only if a full tank of gasoline is being purchased, since these devices operate on the principle of the gasoline in a full tank backing up into the nozzle and thereby cutting off the flow. One of the objects of this invention is to provide a meter control which may be pre-set to discontinue fluid delivery after any number of desired units of fluid have been delivered.

A further object of this invention is to provide a control which may be readily installed on any of the conventional fluid delivery pumping machines.

Also an object of this invention resides in the particular construction whereby the metering of the fluid is extremely accurate even over long periods of continuous usage.

Another object of this invention is to provide a meter control which is easily installed and thereafter maintained.

A further object of this invention is to provide a meter control which is readily fabricated from a minimum of parts.

Other and further objects and advantages will be apparent from the following description taken in conjunction with the accompanying drawings in which like characters of reference designate corresponding parts throughout the several views, and wherein:

Fig. 1 is a front elevation of an embodiment of my invention with parts broken away.

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Fig. 2 is a top view of the embodiment of Fig. 1, with parts thereof broken away.

Fig. 3 is a cross-sectional view taken on the line 3—3 of Fig. 1.

The particular embodiment of my invention chosen for illustration comprises an outer casing or housing which is formed from a casting having a back plate 10, an end support plate 11, and a center portion or center space member 12 forming vertical sides and an arcuate outer end, and a front plate 13 which conforms to the shape of the edge of center portion 12 and is secured to the edge thereof by screws 14. Passing through the front plate 13 and the back plate 10 is a shaft or spindle 15 which is journaled for rotation on the front plate 13 and the back plate 10 and is retained in place by a nut on the threaded end of the shaft 15 adjacent the journal in the back plate 10.

Internally of the casing is a worm gear 16 rotatably supported on shaft 15 through a collar or sleeve 17 which extends from inside the casing out a distance from the front plate 13, and immediately adjacent to worm gear 16 is a flat disc or cam member 18 having a notch or cut out portion 19 cut into its peripheral edge. Cam member 18 has a center opening through which the collar 17 passes. A second and larger collar or sleeve member 20 fits over collar 17 and extends from a point at which it abuts the flat surface of cam member 18 out to a point a short distance from the end of sleeve 17 and an elongated pin 21 fixes the disc 18 to the larger collar 20 so that both are joined together for rotation about the shaft 15. The worm gear 16 has a blank gear portion 22 at which a number of gear teeth are missing for a purpose which will be subsequently described.

Fixed to the outer periphery on a portion of the larger collar 20 beyond the front plate 13 is an adjusting arm member 23 and positioned flat against the surface of member 23 is a circular dial or indicator plate 24 which is supported through a center opening for rotation with the small sleeve 17 but free of the large sleeve 20. Dial plate 24 has an arcuate opening 25 near the outer edge through which passes an adjusting screw 26 into the adjusting arm 23 thereby adjustably fixing dial plate 24 to adjusting arm 23. A dial knob 27 has a center bore into which fits the shaft 15 and the sleeve 17, and the knob 27 is locked to sleeve 17 by a set screw 28 and also fixed to the dial plate 24 by a screw pin 29.

Entering near one corner of the attaching plate 11 into the inside of the casing through

a shaft housing 30 is a drive shaft 31 which carries a worm 32 near its internal end. The shaft housing 30 and the drive shaft 31 are located so that the worm 32 is normally in engagement with the worm gear 16. Since there is space provided between the end of the collar 17 and the back plate 10, the collar 17 with the worm gear 16, the disc 18, the large collar 20, the adjusting member 23, the dial plate 24, and the dial knob 27, is movable axially of shaft 15 toward the back plate 10 to disengage the worm gear 16 from the worm 32. A leaf spring 33 on the inside of back plate 10 presses against the collar 17 and resists axial movement of collar 17 so as to keep the worm 32 and the worm gear 16 normally in engaged position.

An electrical control switch 34 is located internally of the casing on the back plate 10 and has a circuit breaker or switch control arm 35 extending toward the shaft 15 with a bent portion 36 of arm 35 normally pressing against the flat face of the cam disc 18. Switch control arm 35 is spring tensioned at the switch 34 by coil spring 37 so that the arm tends to move toward the back plate 10 in order to open the circuit of the switch. The switch 34 is wired directly into the pump motor of the fluid machine or to a solenoid control for the pumping mechanism so that when the switch is open the pumping stops and conversely when the switch is closed the pumping starts. According to this construction, the switch control arm 35 is normally pushed outwardly by the action of cam disc 18 on the control arm bent portion 36 keeping the circuit closed; but when the disc 18 is in such position that cut-out portion 19 is adjacent control arm bent portion 36, then the arm 35 moves into the cut-out portion 19 to open the switch 34. Further, when the sleeve 17 is pushed axially toward back plate 10, against the action of spring 33, the control arm 35 moves to open the circuit.

The graduations placed on the dial plate 24 each represent one unit of the particular fluid being delivered and an index marker 38 is screwed to front plate 13 in order to indicate the total number of units set for delivery. The relationship of the gear ratio between worm gear 16 and worm 32 and the graduations on dial 24 is such that one revolution of the shaft 31 turns the worm 32 one revolution which drives the gear 16 one unit as shown by the dial plate 24 moving one unit with respect to the index 37. Therefore two revolutions indicate two units on dial 34 and so on up to the maximum of units for that dial.

In the operation of the illustrated embodiment of my invention, the shaft 31 is coupled to the driving pump in such a manner as to cause the delivery of one unit by the pump to rotate the shaft 31 one revolution; however, it is obvious to anyone skilled in the art that as long as the correct ratios of gears are maintained throughout the entire construction, any ratio may be utilized at shaft 31. To deliver any given number of units of fluid, for instance five, the dial knob 27 is pushed inwardly to the dotted line position of Fig. 2, to move the worm gear 16 out of engagement with the worm 32; and the dial knob 27, with the dial plate 24, is then rotated clockwise until the number 5 on the dial is in alignment with the index 38 and the cut-out portion 19 on cam disc 18 is exactly 5 units away from the bent portion 36 of arm 35. Then the dial knob 27, with dial plate 24, is permitted to move outward through the action of the leaf spring 33, thereby engaging the worm gear 16 with the worm 32. During the inward movement of the worm gear 16, which carries with it the cam disc member 18, the actuating arm 35 of the switch 34 moves to open the switch circuit which prohibits the fluid pump from operating; but, upon the outward movement of disc 18 upon the setting of the desired unit 5, the face of cam disc 18 forcing against bent portion 36 moves actuating arm 35 to close the circuit of switch 34 to start the fuel pump.

As the pump operates to discharge the fluid, the shaft 31 turns counter-clockwise, turning the worm 32 and the worm gear 16 counter-clockwise and carrying with it the disc 18 with the bent portion 36 of actuating arm 35 gliding across the surface of disc 18 to maintain the circuit in switch 34 closed. The control arm 35 remains in this position until the cam disc member 18 has turned the desired 5 units at which time the bent portion 36 of control arm 35 drops into the cut-out 19 in disc member 18 thereby opening the circuit of switch 34 and shutting off the fluid pump motor and in this position the disc member 18 has returned to align the zero point with the index 38.

In order to assure accurate delivery of the desired units of fluid, the cam disc 18 is adjustable, with respect to the location of the cut-out 19, relative to the bent portion 36 of actuating arm 35 through the adjusting screw 26 and the slot 25 in plate 24. This makes it possible to compensate for any delay from the time the bent portion 36 drops into the cut-out portion 19 to the time that the circuit of switch 34 is opened and the pump stopped. By loosening the screw 26 the cam disc 18 may be adjusted by moving the adjusting arm 23 either clockwise or counter-clockwise. This changes the position of the portion 19 of cam disc 18 with respect to the bent portion 36 of actuating arm 35, thereby compensating for any lag or lead due to the delay in operation and also permits adjustment after the parts have become worn or dirty.

When it becomes necessary to permit the fluid delivery pump to pump an unlimited quantity, my meter control may be disengaged from operation by pressing the dial knob 27 inwardly to disengage worm gear 16 from worm 32 and rotating dial knob 27 counter-clockwise to where the zero mark on the dial plate is slightly past the index 38; thereby putting the cut-out portion 22 of worm gear 16 in alignment with the worm 32. Then the worm gear 16 is permitted to move outwardly to assume normal position and the worm 32 does not enter into a driving engagement but rotates free in the cut-out portion 22 of the worm gear 16. To place the gears back into a driving relationship it is only necessary to reverse the above procedure.

It will be obvious to those skilled in the art that many modifications and changes may be made in the embodiment shown and described without departing from the scope of my invention as defined in the appended claims.

I claim:

1. In a device of the class described, a casing, a gear mounted for rotation internally of said casing and being movable axially from extended to retracted position, a cam mounted for rotation and axial movement with said gear, means for rotatably adjusting said cam relative to said gear, indicator means movably mounted on said casing, a drive shaft rotatably supported in said

casing, a worm on said drive shaft engaging said gear in extended position, said cam being driven indirectly by said worm acting through said gear means for moving said gear to retracted position, a switch mounted inside of said casing, and a spring tensioned circuit breaker arm on said switch operable by said cam to open said switch.

2. In a device of the class described, a casing, a shaft supported on said casing and extending through said casing, said shaft protruding from the front of said casing, a worm gear mounted for rotation on said shaft internally of said casing, said worm gear being axially movable on said shaft from extended to retracted position, a cam disc member adjustably mounted for rotation with said shaft and axial movement with said worm gear, a cam surface on said cam disc member, an adjusting member fixed to said cam disc and mounted externally of said casing, said adjusting member being arranged to rotatably adjust said cam disc member relative to said worm gear, a dial plate on said shaft externally of said casing, calibrations on said dial plate, an index marker on said casing, said dial plate being adjustably fixed to said adjusting member, selector means removably fixed to said worm gear and said dial plate, said worm gear being movable axially on said shaft to retracted position by said selector means, a drive shaft rotatably supported in said housing, a worm on said shaft engaging said worm gear in extended position, said cam disc being driven indirectly by said worm acting through said worm gear, a switch mounted inside of said casing, a circuit breaker arm on said switch normally abutting the surface of said cam disc member and being operable by said cam surface to open said switch.

3. In a device of the class described, a casing, a shaft supported on said casing and extending through said casing, said shaft having a protruding portion extending outwardly from said casing, a first collar movably mounted on said shaft and having an internal end spaced from the back of said casing and an external end extending outwardly from the front of said casing, said first collar being movable axially of said shaft from an extended to a retracted position, a spring normally retaining said first collar in extended position, a gear fixed for rotation and axial movement with said first collar internally of said casing, a second collar on said first collar having an external end extending outwardly from said casing, a cam disc member fixed to said second collar and being arranged for axial movement with said gear, means on said second collar for rotatably adjusting said cam disc member relative to said first collar, an indicator on said first collar externally of said casing, driving means in said casing for driving said worm gear, said cam disc member being driven indirectly by said driving means acting through said gear switch means in said casing, and control means for said switch means operable by said cam to open said switch.

4. In a device of the class described, a casing, a shaft supported on said casing and extending through a wall of said casing, said shaft having a protruding portion extending outwardly from said casing, a driven gear mounted for rotation on said shaft internally of said casing and being movable axially of said shaft, a cam mounted for rotatation and axial movement with said driven gear and rotatably adjustable with respect thereto, a dial plate mounted for rotation with said shaft externally of said casing, calibrations on said dial plate, an index marker on side casing, a drive shaft rotatably supported in said casing, a gear on said shaft engaging said driven gear in extended position, said cam being driven indirectly by said drive shaft acting through said driven gear, a switch mounted inside said casing, a circuit breaker arm on said switch having an end portion normally abutting said cam member and being operable by said cam to open said switch, and means connected between said cam and said driven gear for compensating for any lag or lead of said switch.

5. In a device of the class described, a casing, a shaft supported on said casing and extending through a wall of said casing, said shaft having a protruding portion extending outwardly from said casing, a first collar movably mounted on said shaft, said first collar being movable axially of said shaft from an extended to a retracted position, a spring normally retaining said first collar in extended position, a driven gear fixed for rotation and axial movement with said first collar internally of said casing, a second collar on said first collar having an external end extending outwardly from said casing, a cam on said first collar and axially movable therewith, said cam being fixed to said second collar, means for rotatably adjusting said cam on said first collar, a dial plate on said first collar externally of said casing, calibrations on said dial plate, an index marker on said casing, selector means on said shaft removably fixed to said first collar and said dial plate, driving means for driving said driven gear, said driven gear being disengaged from said driving means in retracted position said cam being driven indirectly by said driving means acting through said driven gear, switch means in said casing, and control means on said switch means operable by said cam to open said switch.

6. In a device of the class described, a casing comprising a front plate, a back plate, and intermediate plates spacing apart said front and back plates, a shaft supported on said front and back plates and extending through said casing, said shaft having a protruding portion extending outwardly from said front plate, a first collar movably mounted on said shaft and having an internal end spaced from said back plate and an external end spaced outwardly from said front plate, said first collar being movable axially of said shaft from an extended to a retracted position, spring means normally retaining said first collar in extended position, a worm gear fixed for rotation and axial movement with said first collar internally of said casing, a second collar on said first collar having an external end extending outwardly from said front plate, a cam disc member rotatably adjustable on said first collar and axially movable therewith, said cam disc member being fixed to said second collar, a cut out portion on the periphery of said cam disc member, an adjusting member fixed to said second collar externally of said casing, a dial plate fixed to said first collar externally of said casing, calibrations on said dial plate, an index marker on said casing, said dial plate being adjustably fixed to said adjusting member, a dial knob on said shaft removably fixed to said first collar and said dial plate, a drive shaft housing entering said casing, a shaft rotatably supported in said housing, a worm on said shaft engaging said worm gear in extended position, said cam being driven indirectly by said worm acting through said worm gear, a switch mounted inside of said

casing, a spring tensioned circuit breaker arm on said switch having a portion normally abutting the surface of said cam disc member and being operable by said cut-out portion of said cam disc member to open said switch.

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