

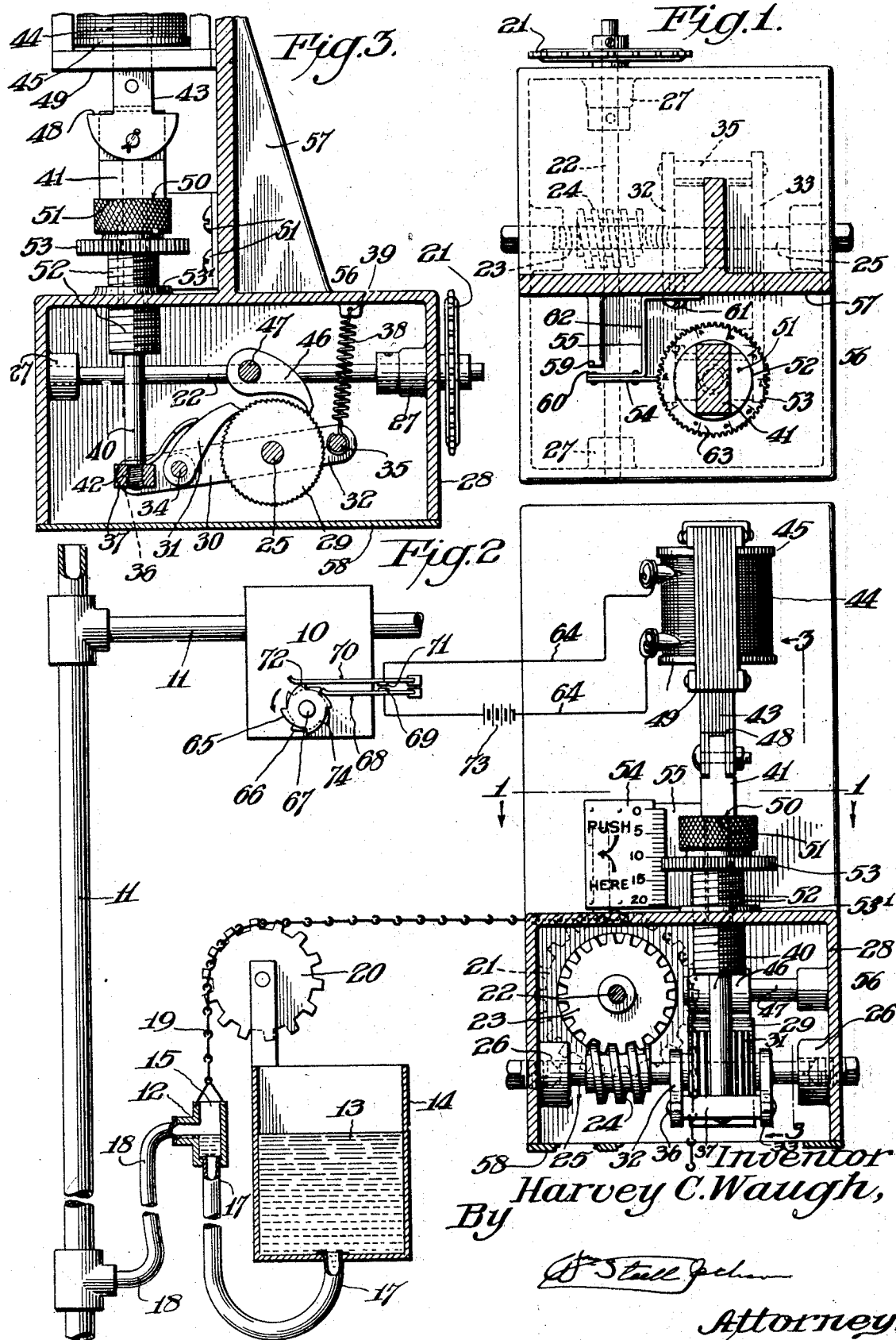
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ADJUSTMENT FOR THROW OF ELECTROMAGNETIC OPERATING MECHANISM

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ADJUSTMENT FOR THROW OF ELECTROMAGNETIC OPERATING MECHANISM

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My invention relates to a liquid proportioner adapted to electrically control the downward feed of a tank outlet member by the operation of a meter, the meter in measuring one flow, intermittently closing and opening an electric circuit to energize and de-energize a solenoid operatively connected to the said downward feed, the frequency and length of the strokes of the solenoid armature determining the rate of downward feed of and the flow through the outlet member.

A purpose of my invention is to provide novel means for adjusting the relation between the movements of a meter measuring one flow and the rate of flow through a tank outlet controlled by the operation of the meter.

A further purpose is to surround a link that is operatively connected to a solenoid armature with a longitudinally adjustable tubular screw having a head adapted to stop the downward movement of the armature and a flange thereon adapted to indicate the position of the stop and thereby the relation between the two flows.

A further purpose is to combine a spring lock member for the screw stop of a solenoid armature with a scale adapted to indicate the position of the stop.

Further purposes will appear in the specification and in the claims.

I have elected to show one form only of my invention, selecting a form that is convenient and efficient in operation and which well illustrates the principles involved.

Figure 1 is a front elevation, part section, showing structure embodying my invention applied to flow proportioning equipment shown diagrammatically except with respect to the detail structure embodying my invention.

Figure 2 is a horizontal section taken upon the line 2—2 of Figure 1.

Figure 3 is a vertical section taken upon the line 3—3 of Figure 2.

Like numerals refer to like parts in all figures.

Describing in illustration and not in limitation and referring to the drawing:—

My invention is directed to a detail adjust-

ment mechanism for varying the relation between two flows continuously proportionate, the said flows comprising any flows needed to be maintained proportionate, but herein being described respectively as raw water and chemical solution added to the raw water for softening purposes, in that it is believed one of the widest applications of the invention should be in water softening.

In the illustration a meter 10 in a raw water line 11 is operatively connected to mechanism adapted to downwardly feed an outlet member 12 in order to discharge liquid 13 from a stationary chemical tank 14 into the stream of raw water measured by the meter 10.

The outlet member 12 is shown as a suspended T open at the top to atmosphere at 15 and flexibly connected at 17 to the bottom of the chemical tank 14 and flexibly connected at 18 to the raw water line 11, the discharge from the chemical tank to the water line being continuously proportionate to the rate of downward feed of the T member 12.

The outlet member 12 is suspended by a sprocket chain 19 which passes from the member 12 upwardly over a sprocket pinion 20 and thence over a sprocket pinion 21 that forms part of my lowering mechanism, the chain hanging free beyond the pinion 21.

The pinion 21 is mounted upon a shaft 22 which carries a worm wheel 23 meshing with a worm 24 upon a shaft 25, the shafts 22 and 25 respectively journaling in suitable bearings 26 and 27 on the sides of the casing structure 28.

The shaft 25 carries a ratchet drum 29 rigidly fastened to it, and a rocker member 30 loosely pivoted upon the shaft 25 carries side-by-side pawls 31 for forwardly feeding the drum when the rocker is angularly reciprocated upon its pivot 25.

The rocker comprises horizontally spaced parallel plates 32 and 33 which are rigidly fastened together by the posts 34 and 35 and afford journal support at 36 for an operating link 37.

The posts 34 and 35 in addition to spacing the plates 32 and 33 respectively give pivot support for the pawls 31 and support for one

end of a tension spring 38 which is anchored at its other end at 39 to the top of the casing structure 28, and assists in the retraction of the rocker 30.

8 The operating link 37 comprises a preferably round rod 40 and head and foot terminals 41 and 42 having horizontal pivot connection respectively to the bottom portion 43 of a solenoid armature 44 and to the rocker 30.

10 The armature 44 of the solenoid 45 is normally in a vertically adjustable low position and energization of the solenoid effected intermittently by the operation of the meter 10 raises the armature, the link 37 and the 15 outer end of the rocker 30 feeding the drum 29 by means of the pawls 31 in a direction to lower the outlet member 12.

When the solenoid is de-energized the rocker retracts to its initial position under 20 the action of gravity and of the spring 38, any retraction of the drum being prevented by one or more suitable pawls 46 pivoted on a pin 47 from the casing structure.

The amount of the forward feed of the 25 drum is adjustable by adjusting the stroke of the solenoid armature and I accomplish this by changing the retracted or low position of the rocker arm.

The solenoid 45 may be of any type that 30 is adapted to give a suitable range of movement to the armature 44.

The armature moves up and down between definite stops, up whenever the solenoid is 35 energized and down when the solenoid is de-energized.

At the end of each up stroke upwardly directed shoulders 48 on the lower end portion 43 of the armature engage the bottom 49 of stationary casing structure of the solenoid 40 and on each down stroke the armature is brought to rest by an engagement between the bottom face 50 on the head 41 of the operating link and the top face 51 of a tubular screw 52.

45 The screw member 52 threads through a boss 53 of the casing structure 28 and has a bore surrounding and larger than the rod portion of the link 37.

The head of the screw 52 is knurled for easy 50 turning and carries a circular flange 53 serrated around its periphery to receive the vertical edge of a scale member 54 mounted on a spring 55.

The scale 54 shows the variant vertical 55 position of the screw and thereby is adapted to show the relation between the flow of water through the line 11 to the flow of chemical from the tank 14.

The casing structure for supporting the 60 solenoid and ratchet mechanism desirably includes a rectangular metal box 56 with a vertical bracket 57 for supporting the solenoid 45 above the closed top of the box.

65 The bottom opening of the box is preferably closed by a suitable plate 58.

The vertical bracket 57 is provided with a forward extension 59 which has its forward face spaced a small distance rearwardly from the inner face 60 of the spring 55.

The spring member 55 is illustrated as of 70 Z-section horizontally, with an inner flat fastened to the vertical bracket 57 by suitable screws 61, an outer flat in position to present the vertical scale 54 radially against the serrated edge of the flange 53 and an intermediate portion 62 extending substantially 75 perpendicularly out from the face of the bracket 57.

Desirably the divisions on the scale 54 have a spacing equal to the pitch of the screw 52 80 with the top of the flange 53 provided with a circumferential angular scale 63 comprising ten uniformly spaced division lines.

The exact vertical position of the screw 85 can then be read easily to one or two thousandths of an inch, the operator reading the position of the top edge of the flange upon the vertical scale and the position of the edge of the scale 54 upon the angular scale 63.

Normally the edge of the scale 54 presses 90 into the serrated periphery of the flange 53 locking the screw from turning by seating in one of the indentations around the screw periphery.

When it is desired to change the setting 95 of the screw, an operator presses the scale over the notation "Push here" which laterally deflects the spring 55, moving the scale radially outwardly from the periphery of the flange member 53, after which the screw is 100 adjusted to its desired position and is locked to place in the new position when the operator ceases to outwardly deflect the scale by pressure upon the notation "Push here".

Any undue straining of the spring is pre- 105 vented by its engagement with the outer edge of the stop member 59.

It will be seen that the connection between the solenoid armature 44 and the link 37 operating the ratchet mechanism may be a rigid 110 one as the armature and link in effect comprise a single member having a sliding connection with the solenoid and having at its lower end a suitable pivot connection with the rocker 30 adapting each upward stroke 115 of the armature to lift the rocker.

I may make any suitable moving part of the meter close and open an electric circuit 64 of the solenoid with a frequency proportionate to the rate of movement of the 120 meter in order to effect a downward ratchet feed of the outlet member 12 at a rate proportionate to the rate of movement of the meter.

In the illustration special contact cams 65 125 and 66 are mounted on a rotary shaft 67 of the meter 10, the shaft 67 being for example the dial-operating shaft of the meter 10.

The cams 65 and 66 rigidly mounted adjacent to one another on the shaft 67, are disc 130

step cams that are respectively engaged by a spring member 68 carrying a contact member 69 and by a cooperating spring member 70 that carries a contact member 71.

The contact members 69 and 71 are of the electric circuit 64 which is open or closed according to whether the contact members are separated or together.

The contours of the cams are generally similar, each including a series of abrupt steps and gradual approach portions, the steps of one cam being relatively staggered with respect to those of the other.

The contacts 69 and 71 are brought together when the spring 70 flies inward at the steps of the cam 66 and are separated when the spring 68 flies inward at the steps of the cam 65.

In the position shown in Figure 2, the contact members 69 and 71 are open and the spring members 68 and 70 are supported so that their free ends rest against the respective cams.

The shaft 67 carrying the cams continuously rotates during the operation of the meter 10 and at a period a little subsequent to that indicated in Figure 2, additional angular movement of the shaft 67 in the direction of the arrow brings the step 72 to the end of the spring 70 which permits this spring to fly toward its cooperating spring 68 thereby bringing the contact 71 into engagement with the contact 69 and closing the circuit 64 through a battery 73 and the solenoid 45, energizing the solenoid to lift the armature 44 up into the solenoid which forwardly feeds the ratchet mechanism.

The meter continuing in its movement in the direction of the arrow brings the step 74 on the cam 66 to the end of the spring 68 which then flies inward away from the first spring to effect a quick break of the circuit.

The solenoid is de-energized when the circuit breaks and the armature 44 drops to its original position upon the top of the screw member 52.

It will be understood that the illustrated mechanism for effecting an energization of the solenoid with a frequency directly proportionate to the rate of operation of the meter may be widely variant and the illustration is intended for any mechanism adapted to effect an energization and de-energization of the solenoid with a frequency proportionate to the flow through the meter 10.

The form of ratchet connection between the rocker 32 and the shaft 30, also may be widely varied and the illustration is intended for a conventional showing of any suitable mechanism for translating each reciprocation of the solenoid armature into a forward feed movement of the shaft 22 positioning the suspension chain 19.

Any lost motion due to failure of any one of the pawls to exactly register with the

rearward surface of the adjacent tooth of the ratchet will be less than the distance between successive ratchet teeth divided by the number of step pawls carried on the ratchet teeth divided by the number of step pawls carried on the pin, as the successive pawls engage the ratchet wheel at progressively different points between adjacent teeth of the ratchet wheel.

The retaining pawls 34 which operate to prevent return movement of the ratchet wheel during the retraction of the rocker 32 may be in every way like the pawls carried on the rocker member.

It is desirable to be able to widely adjust the downward feed of the tank outlet with respect to the movement of the meter 10 and I accomplish this by adjusting the vertical position of the stop member 48 beneath the end of the rocker member 32.

It will also be understood that throughout the specification and claims I have used the term "meter" as meaning any member that moves proportionally to any flow to which a second flow to be delivered from a tank is to be kept substantially proportionate.

In view of my invention and disclosure variations and modifications to meet individual whim or particular need will doubtless become evident to others skilled in the art, to obtain all or part of the benefits of my invention without copying the structure shown, and I, therefore, claim all such in so far as they fall within the reasonable spirit and scope of my invention.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a liquid proportioner, a solenoid, an armature thereof having a length of stroke determining the proportioning setting of the proportioner in combination with an adjustment screw, cooperating abutments presented respectively by the screw and armature, one abutment engaging the other at one end of the stroke to limit the stroke, a flat spring in a plane offset from and substantially parallel to the screw axis, a scale member mounted on one end of the spring in a plane substantially radial to the screw axis, presenting its scale edge normally against the screw periphery to lock the screw and extending radially outward beyond the spring and a rigid support for the other end of the spring, pressure upon the outer portion of the scale being adapted to deflect the spring in a direction to release the screw.

2. Claim 1 characterized by an abutment back of the scale and spaced therefrom for limiting the deflection of the scale.

3. Claim 1 characterized by the screw being tubular and surrounding the armature or an operating extension thereof.

4. Claim 1 characterized by division lines spaced around the periphery of the screw

cooperating with the scale for more closely showing the setting.

5. Claim 1 characterized by the screw being tubular, an operating link operating through the tubular screw, connected to the armature and mounting the abutment presented by the armature, the abutment on the screw comprising the top of the screw, and the screw presenting a peripherally serrated flange at its said periphery.

6. In a liquid proportioner, a plunger, electro-magnetic fluid controlled operating means for lifting and lowering the plunger, a lever lifted and lowered to different extents according to the movement of the plunger, a feeding device for corrective material operated to different extents according to the movement of the lever, a threaded abutment adapted to limit the movement of the plunger, a notched disc movable with the threaded abutment, a spring and a latch connected with the said spring normally engaging the disc and with depression of the spring adapted to free therefrom to permit rotation of the abutment and disc.

7. In a liquid proportioner, an electro-magnetically-operated vertically reciprocating plunger, a vertically adjustable stop therefor threaded for adjustment vertically with rotation of the stop, a notched plate rotatable with the stop and spring means engaging the plate to retain the stop in adjusted position.

8. In a liquid proportioner, a vertically movable electro-magnetically-operated reciprocating plunger, an extension on the lower end of the plunger adapted for proportioner actuation, a stop for the plunger surrounding the extension and threaded for adjustment by rotation of the stop to limit the extent of reciprocation of the plunger.

9. In a liquid proportioner, a vertically movable electro-magnetically-operated reciprocating plunger, an extension on the lower end of the plunger adapted for proportioner actuation, a stop for the plunger surrounding the extension threaded for adjustment by rotation of the stop to limit the extent of reciprocation of the plunger and feed mechanism for material depending for the extent of feeding upon the extent of reciprocation of the plunger.

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