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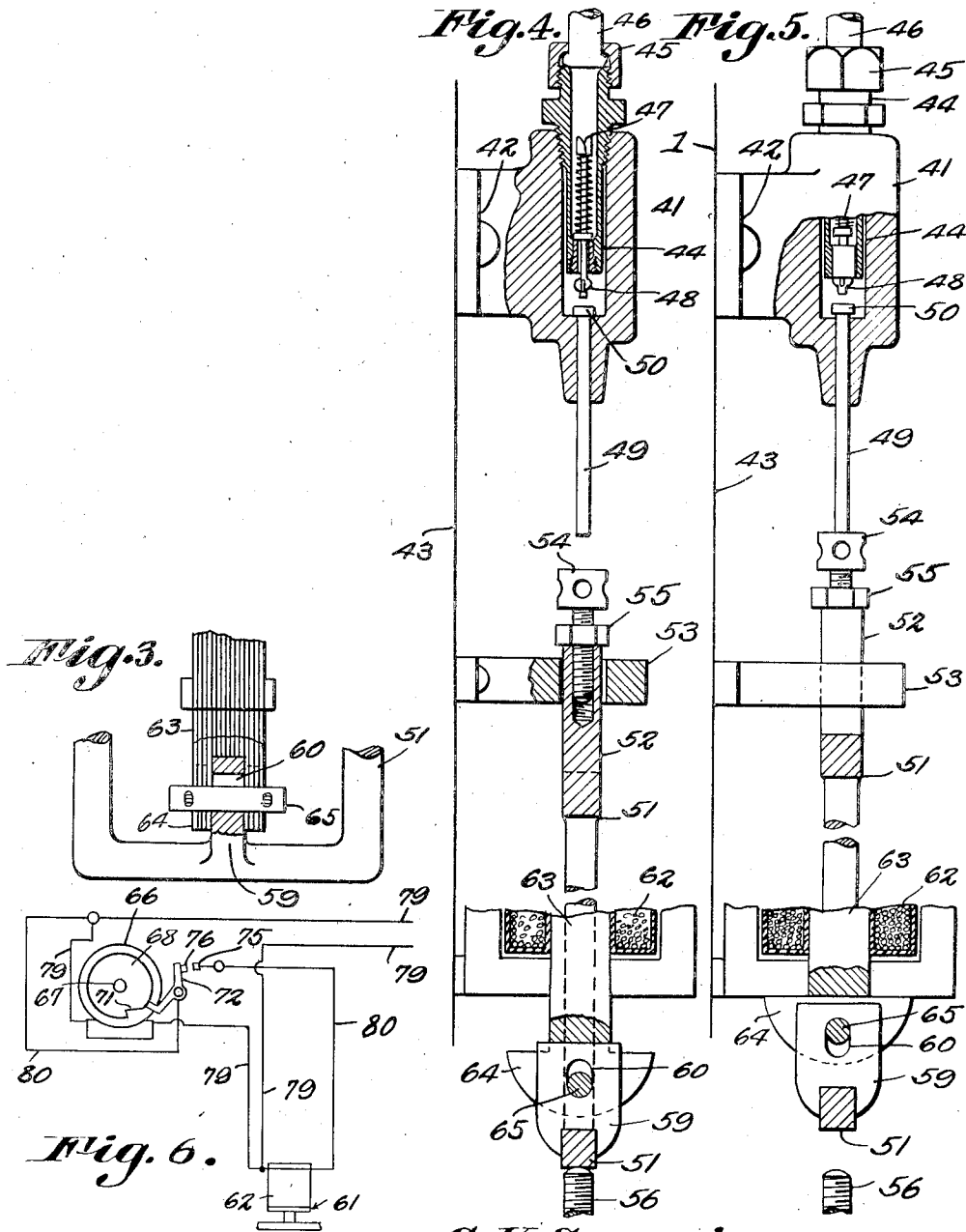
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SAMPLING MACHINE

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SAMPLING MACHINE

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5 Claims. (Cl. 175—341)

The object of this invention is to provide novel valve means for securing a drop-by-drop discharge of liquid to be sampled, or handled otherwise.

Improvements in the structural features into which the aforesaid valve means may be resolved, is within the purview of the invention.

It is within the province of the disclosure to improve generally and to enhance the utility of devices of that type to which the present invention appertains.

With the above and other objects in view, which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed, may be made within the scope of what is claimed, without departing from the spirit of the invention.

In the drawings:

Figure 1 is an elevation showing the valve means whereby a drop-by-drop discharge of the liquid is obtained;

Figure 2 is a vertical section on the line 2—2 of Fig. 1;

Figure 3 is a vertical sectional view, mostly in elevation, showing a detail of the mechanism which operates the valve that controls the flow of liquid;

Figure 4 is a vertical sectional view disclosing the parts as they will appear whilst the valve that controls the flow of liquid is closed;

Figure 5 is a view similar to Fig. 4, but showing parts in an altered relation, which will be understood best after the specification has been read;

Figure 6 is a circuit diagram.

The numeral 1 marks an upright, through which extends a pipe or conduit 39, and a flow-control, for liquid passing through the conduit, is provided. The conduit 39 leads upwardly and laterally to a valve housing 41, secured at 42 to a vertically elongated member 43. The member 43 is fastened to the upright or support 1. A valve casing 44, of tubular form, is threaded into the upper end of the housing 41, and is connected by a coupling 45 to a pipe 46, which furnishes the water or other liquid to be sampled. A downwardly closing, spring-actuated valve mechanism 47 is renewably threaded into the lower end of the valve casing 44. The valve mechanism 47 need not be described in detail, because it may be the common Schroeder air valve construction.

For the purposes of this specification, it is enough to say that the valve mechanism 47 includes a depending stem 48. A tappet 49 is mounted for reciprocation in the lower part of the valve housing 41, in axial alinement with the stem 48 of the valve mechanism 47. Downward movement of the tappet 49 is concluded by a head 50 on the upper end of the tappet and adapted to engage the housing 41.

Electro-mechanical means is provided for raising the tappet 49, the tappet, in turn, raising the stem 48 of the valve mechanism 47, and permitting liquid to flow to the pipe 39, by way of the pipe 46, the valve casing 44, and the valve housing 41.

A loop-shaped hammer 51 is provided and constitutes means for opening the valve mechanism 47, by way of the tappet 49. The part 51 is called a hammer because it acts percussively on the tappet 49. The hammer 51 does not simply rise to raise the tappet 49 and the stem 48 of the valve mechanism 47. Factually, the hammer 51 imparts an upward blow to the tappet 49, and then moves downwardly into limited retirement with respect to the tappet, an operation which, as to detail and as to utility, will be more clearly apparent hereinafter.

At its upper end, the hammer 51 is equipped with a stem 52, having vertical reciprocation in a bearing bracket 53 on the support 43. An adjusting screw 54 is threaded into the upper end of the stem 52 of the hammer 51 and is held at varied effective lengths by means of a lock nut 55, threaded on the screw and engaged with the upper end of the stem 52 of the hammer 51.

Downward movement of the hammer 51 is terminated by engagement with an adjusting device 56, threaded into a lug 57 on the support 43, a lock nut 58 being used to maintain the effective length of the screw or stop 56. The lower part of the hammer 51 is supplied with an upstanding finger 59, in which there is a vertically elongated slot 60.

The numeral 61 designates a solenoid magnet, mounted on the support 43. The solenoid magnet 61 includes a coil 62, and an armature 63 which is responsive to the coil. At its lower end, the armature 63 has spaced ears 64, between which the finger 59 on the lower part of the hammer 51 is received. A cross pin 65 is secured in the ears 64 of the armature 63 and has limited up and down movement in the slot 60 which is formed in the finger 59 on the lower part of the hammer 51.

An electric motor 66 is mounted behind a face

plate 69, secured to the standard 1 by a bracket 70. The motor 66 is of the electric clock variety, and is so constituted that it will turn the arbor 67 of the motor one rotation in a specified time, for instance one rotation per minute. A disk 68 is secured to the arbor 67. The disk 68 is provided with a peripheral notch 71.

A lever 72 is fulcrumed intermediate its ends at 73, on the face plate 69. A holder 74 is mounted on the face plate 69 and carries an adjustable contact 75. The contact 75 is adapted to cooperate with a contact 76 on one end of the lever 72. The opposite end of the lever 72 is held against the periphery of the disk 68 by a curved spring 77, attached by a securing means 78 to the face plate 69. The contact 76 holds the spring assembled with the lever 72, the spring tending to space the contacts 76 and 75, until the lower end of the lever 72 enters the notch 71 in the disk 68. The parts under consideration constitute a time switch.

The motor 66 is in a closed circuit 79, and the motor, therefore, operates continuously. The winding 62 of the solenoid magnet 61 is in an open circuit 80, branched off from the circuit 79 and open when the contact points 75 and 76 are spaced apart by the action of the spring 77, and whilst one end of the lever 72 is riding on the periphery of the time-actuated disk 68.

The motor 66 rotates the shaft 67 and the disk 68, for example, at one turn per minute. When the notch 71 in the disk 68 reaches the lower end of the lever 72, that end of the lever drops into the notch under the impulse of the spring 77. The contacts 76 and 75 are brought into engagement. The circuit 80 of the coil winding 62 of the solenoid magnet 61 is energized. The armature 63 responds to the coil 62 and moves upwardly.

The adjusting screw 54 on the upper end of the hammer 51 moves upwardly, raising the tappet 49. The tappet 49 raises the stem 48 of the valve mechanism 47, thereby opening the valve mechanism, so that liquid can flow through the pipe 46, the housing 41 and the conduit 39.

The foregoing constitutes merely a gross description of the operation which consists in opening the valve mechanism 47. It will be observed that the lower end of the lever 72 takes a considerable amount of time in riding out of the notch 71 in the disk 68. During that interval, the contacts 76 and 75 are closed on each other, and the hammer 51 would remain raised, in engagement with the tappet 49, for a corresponding interval, the valve mechanism 47 being held open, if no means were provided to avoid such contingency. It is desirable to have the valve mechanism 47 held open for an instant only, in order that no more than a drop of water can pass through the valve mechanism, from the pipe 46 into the conduit 39.

When the armature 63 of the solenoid magnet 61 rises, the hammer 51 is thrown upwardly, moving independently of the armature 63, since the slot 60 in the finger 59 of the hammer 51 receives the cross pin 65 which is carried by the armature 63 of the electro-magnet. The result is that the hammer 51 jumps upwardly, independently of the armature 63 of the solenoid magnet, and the screw 54 hits a light tap on the member 49, raising that member and opening the valve mechanism 47, by way of the stem 48. Having hit its blow, the hammer 51 drops down, independently of the armature 63 of the solenoid magnet, the tappet 49 dropping until its

head 50 engages the lower part of the housing 41. In Fig. 5, the hammer 51 is shown in its lowered position, before the tappet 49 has been completely lowered, by the downward movement of the armature 63. The stem 48 of the valve mechanism is shown raised, and a drop of water passes from the pipe 46 into the conduit 39. The relation shown in Fig. 5 as existing between the stem 48 of the valve mechanism 47 and the head 50 of the tappet 49 exists for an exceedingly brief interval of time, in fact, only long enough to let a drop of liquid pass from the pipe 46 to the conduit 39. Since the valve mechanism 47 closes quickly, the lower end of the lever 72 in Fig. 1 can take its time in riding out of the notch 71 in the disk 68. The valve mechanism 47 is not held open during that interval.

The time switch shown at the upper left hand corner of Fig. 1 causes the winding 62 of the solenoid magnet to be energized. The armature 63 is raised and the valve mechanism 47 is opened, permitting liquid to flow from the pipe 46 to the conduit 39. The throw of the hammer 51, independently of the armature 63, reduces the flow of liquid to a mere drop.

The adjustable upper screw 54 on the stem 52 of the hammer 51 determines the amount that the tappet 49 and the stem 48 of the valve mechanism 47 are lifted, and consequently regulate the amount that the valve mechanism is opened, the amount of liquid flow being governed accordingly. The lower screw 56, which is carried (Fig. 2) by the support 43, governs the amount that the hammer 51 can travel upwardly, independently of the armature 63, and consequently regulates the force of the blow that is imparted to the tappet 49, to open the valve mechanism 47.

The device is so constructed that it can be taken down readily for cleaning. If the operator wishes, he can run sterilizing liquid through the line of liquid flow that begins with the pipe 46 of Fig. 4 and ends with the pipe 39.

Having thus described the invention, what is claimed is:

1. In a valve opener, a solenoid magnet comprising a winding and an armature responsive to the energization and deenergization of the winding and mounted for straight-line upward and downward reciprocation, a hammer external to the armature and mounted for straight-line upward and downward reciprocation in a direction substantially parallel to that of the armature, and a mechanical, vertically-effective lost-motion connection between the armature and the hammer and permitting the hammer to rise, at first responsive to the upward movement of the hammer, and then independently of the hammer, to impart an abrupt valve-opening tap before the armature has reached the limit of its upward movement.

2. A valve opener constructed as set forth in claim 1, in combination with means under the control of an operator, and adjustably mounted on the upper portion of the hammer, for varying the effective length of the hammer and thereby avoiding an interchange of hammers of different lengths.

3. In a valve opener, a solenoid magnet comprising a winding and an armature responsive to the energization and deenergization of the winding and mounted for straight-line upward and downward reciprocation, a loop-shaped hammer extended about the armature and provided on its upper portion with an upstanding, tap-imparting stem, a fixed bearing receiving the stem

for reciprocation, a mechanical, lost-motion connection between the armature and the lower portion of the hammer, and permitting the hammer to rise, at first responsive to the hammer, and then independently of the hammer, to cause the stem to move abruptly to valve-tapping position.

4. A valve opener constructed as set forth in claim 3, and wherein the lost motion connection embodies an upstanding part on the lower portion of the hammer overlapped vertically on the

lower portion of the armature, and a pin and elongated-slot connection between said overlapped parts.

5. A valve opener constructed as set forth in claim 3, in combination with means under the control of an operator, and adjustably mounted on the stem, for varying the effective length of the hammer and thereby avoiding an interchange of hammers of different lengths.

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