

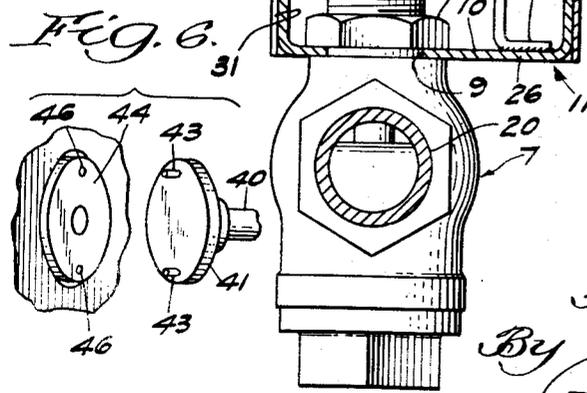
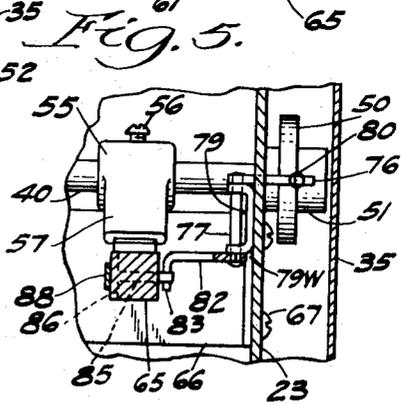
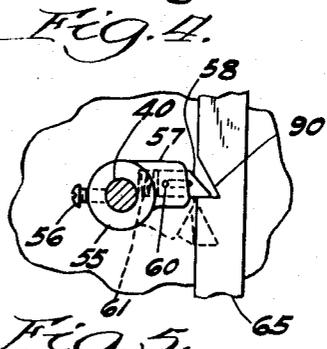
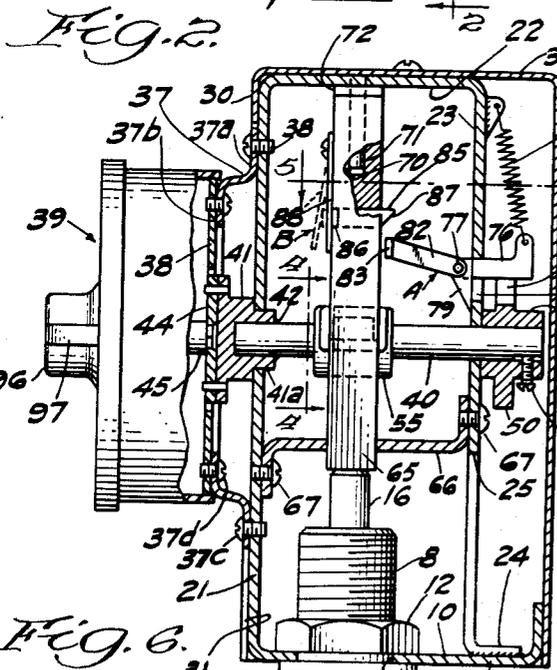
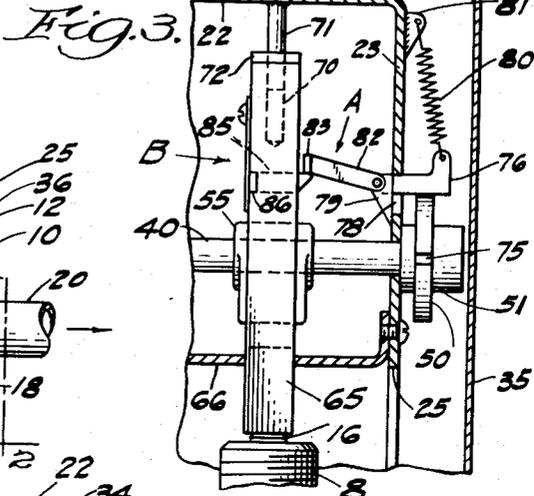
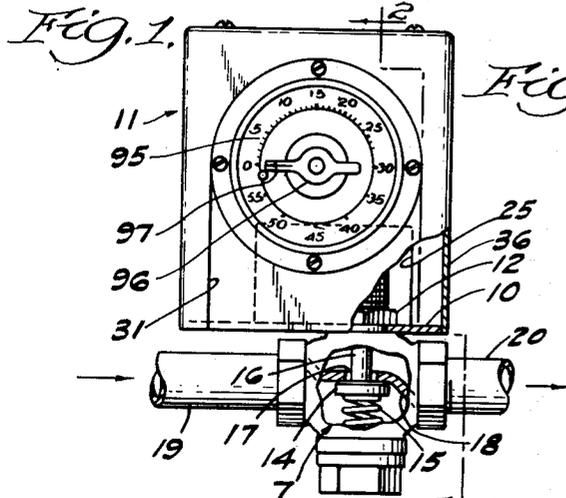
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A. M. BLOOM

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TIME CONTROLLED VALVE CLOSING MECHANISM

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Inventor:
Abe M. Bloom.
By *P. P. Carlson*
Atty.

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TIME CONTROLLED VALVE CLOSING MECHANISM

Abe M. Bloom, Van Nuys, Calif.

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8 Claims. (Cl. 161-7)

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This invention relates to a time controlled valve closing mechanism.

More specifically the present invention pertains to a device, applicable to valves which when allowed to do so automatically close themselves, which can be set so that, after the lapse of a predetermined length of time, means holding open the valve associated therewith will be released so that the valve will be maintained in an open condition until the delivery of the amount of fluid, flow of which is controlled by such valve.

A considerable number of devices have been patented to time-control the open condition of valves, but an investigation of the prior art fails to disclose a device of this kind which provides a valve release mechanism that is adapted to be made as an attachment to timers already on the market. Obviously the cost of manufacture is increased when, not only a valve release mechanism has to be made, but also a timer to co-operate therewith.

Accordingly, it is an object of the present invention to provide a time controllable valve release mechanism which can be readily attached to timers already on the market.

Another object is to provide for a valve of the self-closing type having a projecting valve stem which is depressible against a spring in the valve to open the valve; an improved assembly of timer operable parts wherein, a reciprocable member axially abutting said valve stem and which has been moved to a latched position wherein it depresses said stem and holds the valve open, is automatically released after the elapse of a period of time predetermined by a pre-setting of the timer, so that, when released, the valve's spring will automatically move said valve stem outwardly and open the valve.

Accordingly, the present invention is embodied in a new and improved assembly of co-operating parts wherein the aforesaid reciprocable member has, extending in an adjacent, rightangular relation thereto an operating shaft which is axially connected to the minute shaft of a conventional timing mechanism to rotate therewith, said operating shaft carrying means to move said stem to the valve opening position when the timer is pre-set; and means carried by said shaft to release a latching mechanism associated with said reciprocable member when the timer, after being pre-set, rotates said operating shaft back to its original position.

Other objects, advantages and features of invention will hereinafter appear.

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Referring to the accompanying drawing, illustrative of a preferred embodiment of the invention,

Fig. 1 is an elevational view of the complete device, attached to a valve which controls the flow of water from a source of supply to a place of use, parts being broken away to disclose underlying structures. The valve is shown in its normal, closed position.

Fig. 2 is an enlarged section taken on line 2-2 of Fig. 1, except that portions are shown in side elevation.

Fig. 3 is a fragmentary reproduction of a portion of the structure shown in Fig. 2, with the working parts set in their operative positions.

Fig. 4 is a fragmentary vertical section on line 4-4 of Fig. 2.

Fig. 5 is a fragmentary transverse section on line 5-5 of Fig. 2.

Fig. 6 is a perspective view showing the connecting means provided by this invention, between the conventional timer mechanism and a valve to be closed after a period of time which is predetermined by setting said timer mechanism.

Referring in detail to the drawing, in Figs. 1 and 2 is shown a conventional valve casing 7 having an externally screwthreaded portion 8 extending through an opening 9 through the floor portion 10 of a casing 11 for supporting the working parts of the invention hereinafter described. Said screwthreaded part is secured to said floor portion 10 by means of a lock nut 12.

From Fig. 1 it will be seen that the conventional valve casing 7 is provided with a valve 14 normally held to its seat by means of a compression spring 15. Said valve has secured to it an operating stem 16 extending with a working fit through an opening 17 in a partition 18, said partition extending in a generally horizontal direction, but being of the stepped type shown, so that the inlet pipe 19 and outlet pipe 20 can be placed on substantially the same level.

The already mentioned casing 11 consists of an inner and an outer section, said inner section including a vertical front wall 21 (which is an upward continuation of the floor 10), a top wall 22 and a rear wall 23, said floor and wall portions 21, 22, and 23, by preference and as shown, consisting of a single sheet of stiff sheet material bent as best shown in Fig. 2. Said rear wall 23 has rearwardly directed foot portions 24, one at each side of a spacious cut-out 25, said foot portions being secured to the floor 10 by welds 26. The inner casing structure,

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which has just been described, has open opposite sides which are closed by the outer casing or hood structure next to be described.

The hood or outer part of the main casting structure 11 comprises a front wall 30 which is extensively cut away, as indicated at 31, from its lower edge to a point subjacent to its top, the cut out part or opening being semicircular throughout its top portion. Said outer casing structure has a top wall 34, back wall 35 and side walls 36, one of which is partly shown in section in Fig. 1, and is open at its lower end, so that it may be downwardly telescoped over the aforesaid inner casing structure, thus completing the casing structure 11, as is well illustrated in Fig. 2.

Referring again to the spacious opening 31 in the casing wall 30, within the arcuate upper part of said opening is fitted the basal flange 37a of an annular mounting member 37 which has a forwardly offset flange portion 37b. Said basal flange 37a is secured to the casing wall 21 by screws 37c and said flange portion 37b is secured by screws 37d to the centrally apertured back plate 38 of the conventional timer 39.

A timer driven operating shaft 40 has concentrically secured to its front end a circular driving head 41 by welding 42, said head having a diametrically reduced end portion 41a turnably fitted within a circular opening provided for it in the wall 21. The peripherally flanged front end portion of said head carries two diametrically opposite pins 43, and in order to adapt the disk 44, which is secured concentrically to the minute shaft 45 of the timer 39, has two diametrically opposite holes 46 drilled through it to receive the aforesaid pins 43 when the casing structure which has been described is attached to the timer as shown in Fig. 2. The rear end portion of said shaft 40 is turnably fitted within a circular bearing opening provided for it in the casing wall 23, and rearwardly of this wall, a disk 50 having a hub portion 51 is concentrically secured to said shaft by a screw 52.

Between the casing walls 21 and 23 the shaft 40 has concentrically secured to it a short sleeve 55 by means of a set screw 56. This sleeve carries integrally a lateral extension 57 into the outer end of which extends a passage which forms a guide way for an extensible and retractible dog 58, the nose of which is beveled as shown in Fig. 4. From this view it will be seen that said dog is provided with a longitudinal slot and said extension carries a pin 60 extending through said slot to limit the outward movement of said dog under the urge of its spring 61.

The aforesaid dog 58 plays an important part in controlling the movements of an operating stem 65 the lower end of which axially aligns with the valve stem 16 and always engages the top of that stem. Said stem 65, in its upper, inoperative position shown in Fig. 2, allows the spring loaded valve 14 to close; but when in its lower, operative position shown in Fig. 3, it maintains said valve in its open position.

The reciprocable member or operating stem 65 is square in cross section and its lower end portion is slidably fitted within a square aperture in a cross wall 66 which bridges the space between the casing walls 21 and 23 and has oppositely deflected end portions secured to said walls desirably by the screws 67 shown in Fig. 2, being thus mounted in a rectangular, adjacent relation to the aforesaid operating shaft 40.

Into the upper end of said operating stem extends an axial bore 70 which contains, with a

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working fit, a guide pin 71 the upper end of which is anchored to the casing wall 22. An elastic bumper 72 is preferably interposed between the upper end of said stem and said wall 22.

Returning to the disk 50 carried by the rear end portion of the shaft 40, across one side of said disk there is deeply cut thereinto a radial slot 75 into which, at times, enters a vertically swingable arm 76 which is rigidly secured to one end of a rock shaft 77 that swings in a vertical slot 78 provided for it in the wall 23. Said shaft 77 is journaled upon and between the arms of a U-shaped bracket 79 secured by welds 79w to the front side of the wall 23.

A spiral tension spring 80 extends downwardly from a lug 81 carried by the upper part of the casing wall 23, the lower end of said spring being attached to the free end of said arm 76 to relieve the pressure of said arm upon the underlying disk 50 and at times to withdraw said arm from the aforesaid radial slot 75.

That end of said rock shaft 77 opposite to the arm 76 has rigidly secured to it one end of a limb 82, the free end of said limb carrying a right-angularly directed horizontal end portion or finger 83. The aforesaid shaft 77 and spring controlled parts which rock therewith, constitute one unit, designated A, of a two-part latching means which, at times holds the operating stem 65 in its depressed position against the opposition of the valve spring 15. The other unit of this latching means, designated B, will now be described in detail.

The aforesaid operating stem 65 carries the latching unit B which co-operates with the aforesaid limb 82 to control the movements of said rock shaft 77 and parts secured thereto. This B unit comprises a horizontally slidable T-shaped detent 85 and is transversely mounted with a working fit in a slot provided for it through the operating stem 65. This detent carries at one end a cross-head 86 normally contained in a countersink provided for it in the front side of the operating stem 65, see Figs. 2 and 5, and the opposite end of said detent is provided with a beveled face 87 which is directed downwardly and away from said operating stem. A pendant leaf spring 88, having its upper end portion secured to the front side of the operating stem at a point spaced considerably above said detent, normally maintains said detent with its beveled end portion projecting from the rear side of the operating stem 65, as shown in Fig. 2.

The aforesaid dog 58, which is carried by the main shaft 40, normally projects into an overlying relation to an upwardly facing shoulder 90 on the vertical operating stem 65, said shoulder resulting from notching said stem as shown in Fig. 4.

Speaking briefly of conventional parts of the timer 39, with which the device co-operates, said timer carries a minute indicating dial 95 and is provided with a manually turnable setting member 96 carrying a pointer 97 which co-operates with the minute indications of said dial.

In the pre-setting operation, the operator turns the pointer 97 of the timer in the clock-wise direction whatever distance is necessary to maintain the valve open the desired length of time. The initial part of this turning movement (through an arc of about thirty degrees), causes the dog 58 to depress the operating stem 65 to the position wherein said stem has opened the valve and at the same time caused the catch units A and B to assume the positions, shown in

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Fig. 3, wherein the operating stem 65 is maintained in the aforesaid position to hold the valve open.

After the operator completes the aforesaid pre-setting operation, and releases his hold upon the pointer of the timer, the latter begins an anti-clockwise movement of the shaft 40 and disk 50 carried thereby, which movement continues until the disk's slot 75 registers with the catch arm 76. When said arm and slot are thus brought into registry the latch unit A is allowed to swing its arm 82 and finger 83 upwardly from the detent 85 of the latch unit B, and this operation allows the valve's spring 15 to overcome the opposition of the spring 83 and force the two stems 16 and 65 outwardly and upwardly, thus automatically closing the valve after the desired amount of liquid has flowed through the conduit means controlled by said valve.

It is to be understood that the spring 80 is sufficiently strong to prevent undesirable friction of the arm 76 against the periphery of the disk 50, but the valve spring is the stronger of the two springs and, therefore, causes said arm 76 to enter said slot 75 when the slot and arm come into registry with each other. Said pointer 97 and radial slot 75 of the disk 50 are so related to each other circumferentially of the shafting from which they radially extend, that, when said pointer reaches the zero indication on the dial said arm will drop into said slot.

When, after a pre-setting operation, the timer mechanism approaches the limit of its unwinding or return movement, the spring pressed dog 58 contacts the adjacent face of the square operating stem 65 and, although depressed by contact therewith, moves on to its horizontal position (which accords with the zero position of the pointer 97), and by the time it has reached that position the slot 75 of disk 50 also reaches its vertical position wherein it registers with and releases the latch arm 76, causing the latch unit A to free the operating stem 65, whereupon the valve spring 15 will cause said stem to move up to its normal position and will simultaneously close the valve.

I claim:

1. In a device of the kind described, a mounting means, an elongated vertically reciprocable member mounted upon said mounting means and connected with a valve to control the operation of the latter, said valve being spring loaded in a manner yieldingly to hold it in the closed position, an operating shaft rockably mounted upon said support in an adjacent right angular relation to said member, said operating shaft being axially aligned with and operatively connected to a knob operable shaft of a timing mechanism so that said shafts turn in unison, said knob operable shaft being manually turnable to pre-set the time required for said timing mechanism to rotate said shafts back to their normal position after a pre-setting operation, means carried by said operating shaft and operatively juxtaposed to said reciprocable member whereby initially to depress the latter and open the aforesaid valve, two interlocking latching units acting between said reciprocable member and operating shaft to latch said reciprocable member in the depressed position until the time pre-set for the running of said timing mechanism runs out, one of said latching units being swingably carried by the aforesaid mounting means and comprising an arm extending radially from the axis of its swing, and the other of said units being carried by said

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reciprocable member and comprising a spring pressed retractable bolt, said bolt having a cam face normally projecting laterally from said reciprocable member over which a portion of said swingable unit glides when said reciprocable member is depressed by the aforesaid pre-setting operation, a disk concentrically secured to said operating shaft and provided with a radial slot which leads into the disk from its periphery, said radial arm of one of said latching units riding upon the periphery of said disk until the run out time positions said slot for being occupied by said arm thereby to free said swingable latching unit to swing from an overlying relation to the projecting portion of said bolt to a position wherein it frees the latter so that the valve spring closes the valve and restores said reciprocable member to its normal position.

2. The subject matter of claim 1 and said bolt being slidably fitted in a transverse passage through said reciprocable member, said bolt having at the end thereof opposite to its bevel a crosshead, and a leaf spring carried by said reciprocable member in engagement with the outer side of said head.

3. In a device of the kind described, a casing, an elongated reciprocable member mounted on said casing, said reciprocable member being maintained by said casing in an axially aligned contacting relation to the outer end of the valve stem of a valve of the type wherein the valve includes a spring positioned to extrude the valve stem and close the valve, an operating shaft axially aligned with the minute shaft of a timer to turn therewith, said operating shaft extending in an adjacent rightangular relation to said reciprocable member, means carried by said operating shaft to move said reciprocable member to a latched position wherein it holds the valve open, said means being operated by the pre-setting of the timer and resultant turning of said operating shaft, and means carried in part by said operating shaft and in part by said casing to unlatch said reciprocable member at the expiration of the time during which said operating shaft is rotated by the timer back to its original position, said unlatching means comprising a disk having a slot leading radially thereto, said disk being fixed to said operating shaft to turn therewith, and the part of said latching means carried by the casing being swingably mounted and having an arm extending radially from the axis of its swing, said arm at the expiration of the pre-set time entering said slot and releasing the latching means.

4. A device of the kind described comprising a casing, a vertical, longitudinally movable operating stem carried by said casing in an endwise axial engagement with the stem of a valve having a spring tending to close said valve and at the same time move both of said stems outwardly in relation to the valve, an operating shaft turnably mounted in said casing in an adjacent, right-angular relation to said operating stem, a dog carried by said operating shaft in a radially projecting relation thereto, said dog being in a co-operative relation to said operating stem, at times to move it longitudinally to a position wherein it presses forcibly against said valve stem and thereby opens said valve, latching means comprising two co-operating units, one carried by said casing and the other by said operating stem to latch the latter at times in the aforesaid position wherein it holds the valve open, means axially connecting said shaft to the minute shaft of a

timer operated mechanism to turn with said minute shaft, said minute shaft being manually turnable to pre-set the time for the reverse rotation of said operating shaft by the timer through a predetermined angle of rotation after said operating stem has been initially operated by said pre-setting operation to depress the valve stem against the opposition of the valve's spring, and means carried by said operating shaft to release said latching unit which is carried by the casing after the timer has reversely rotated said operating shaft to its initial position, the release of the latter latching unit releasing also the aforesaid stem carried latching unit, whereupon the valve's spring restores the aforesaid two stems to normal position.

5. The subject matter of claim 4 and said means carried by said operating shaft to release said latching unit which is carried by the casing consisting of a disk concentrically secured to said shaft, said disk having a radial slot leading into it from its periphery and the latter latching unit comprising a swingable arm which rides upon the periphery of said disk and releases the latching unit of which it forms a part by entering said slot when said disk and shaft complete their reverse rotation after the time has been pre-set, as aforesaid.

6. A casing having a spring pressed valve operating stem projecting thereinto, a vertically reciprocable member mounted in said casing in an axial relation to said valve stem with one end thereof in an abutting relation to the end of said valve stem, an operating shaft mounted in said casing in axial alinement with and operatively connected to a knob operable shaft of a timing mechanism, means carried by said operating shaft and operatively connected to said reciprocable member whereby to depress the latter and in turn the valve stem abutted thereagainst to open the valve, interlocking means acting between said reciprocable member and said operating shaft to latch said reciprocable member in the position wherein it holds the valve open until the time pre-set for the running of said timing mechanism expires, said interlocking means comprising two associated interlockable units, one of said units being carried by said reciprocable member and comprising a yieldably opposed retractable bolt extending transversely in relation

to said reciprocable member, said bolt having a cam face projecting from one side of said reciprocable member, the other of said units being rockably mounted upon the casing and comprising a locking finger extending radially from the axis about which it rocks, said finger having its free end normally subjacent to said bolt but contactable with the cam face thereof to retract the bolt during the depressing of said reciprocable member and then to pass up over said bolt and maintain said reciprocable member depressed until the set time expires as aforesaid.

7. The subject matter of claim 6 and means carried by said operating shaft and operatively connected to the casing carried unit of the interlocking means, to cause the latter unit to act upon the other unit and thereby unlatch said reciprocable member when the aforesaid pre-set time expires.

8. The structure set forth in claim 6 and a disk concentrically mounted on said operating shaft and provided with a radial slot leading thereinto from its periphery, said timing mechanism comprising a dial having a zero indication and a pointer associated with the knob thereof, said pointer and said slot occupying the same circumferential position in relation to the shafting from which they radially extend, so that when the pointer returns to the zero position said slot is brought into register with a part of said rockable unit to release the latter from its interlocked relation to the aforesaid bolt so that the valve spring is free to move upwardly the valve stem and aforesaid vertically reciprocable member, thus opening the valve.

ABE M. BLOOM.

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