Feb. 24, 1953 H. J. WEEKS 2,629,437

VALVE TIMER

Filed March 23, 1950 3 Sheets-Sheet 1

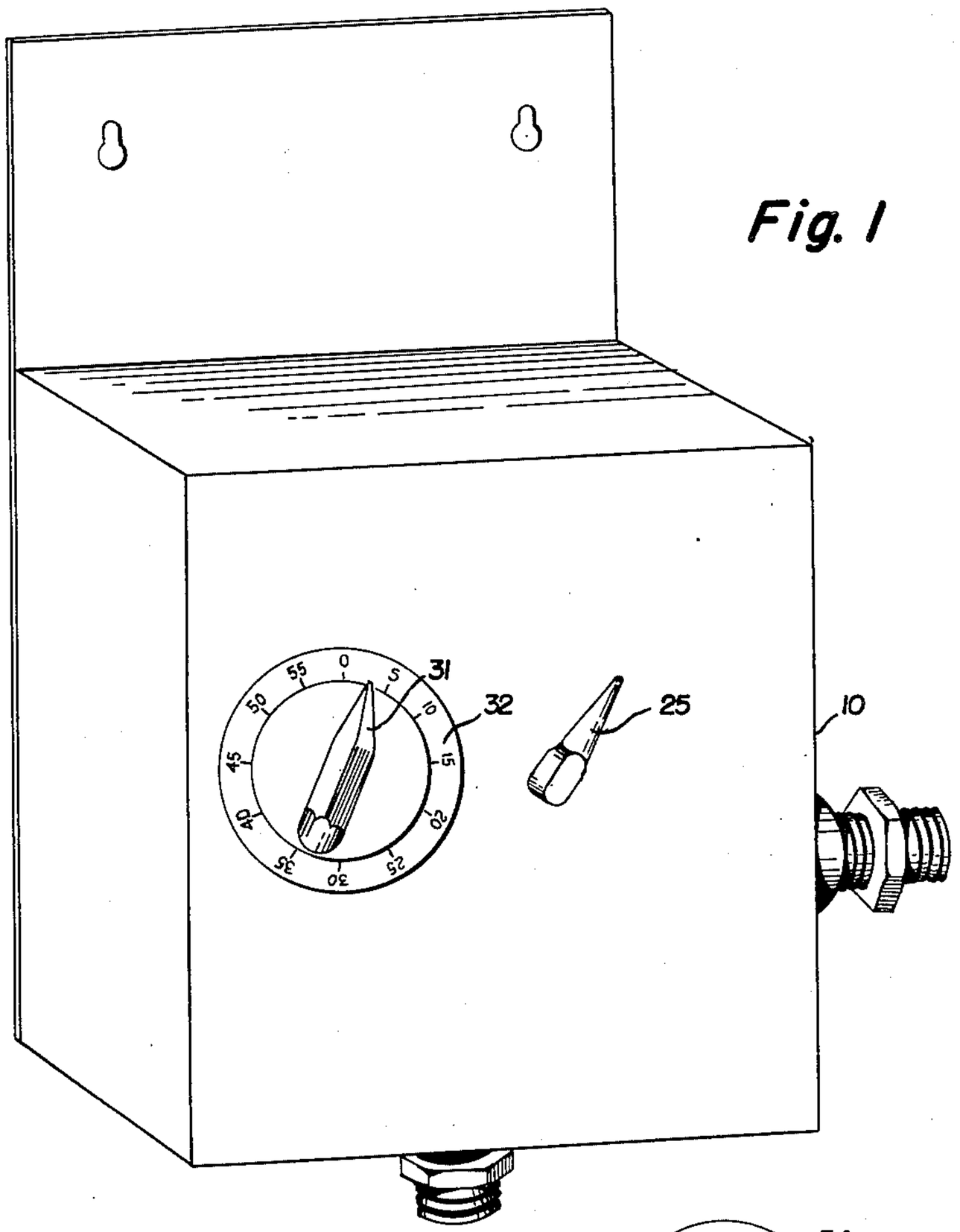

Fig. 1

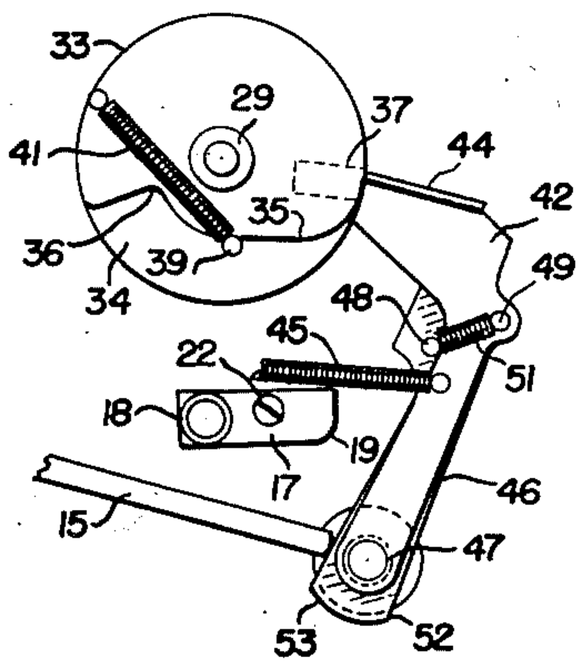

Fig. 5

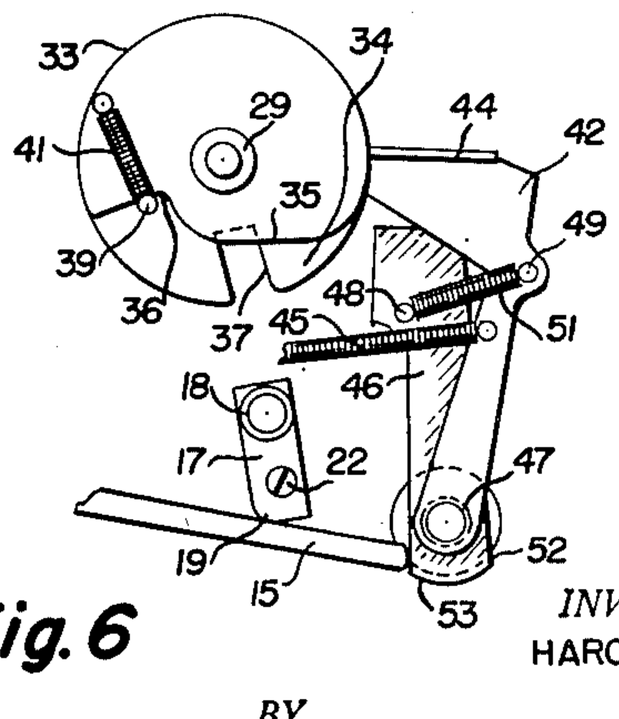

Fig. 6

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VALVE TIMER

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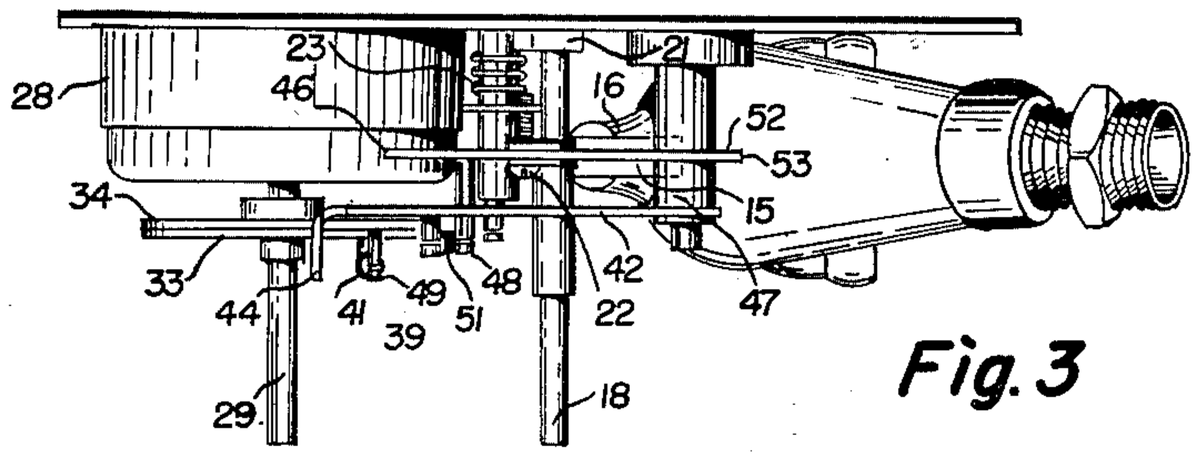

Fig. 3

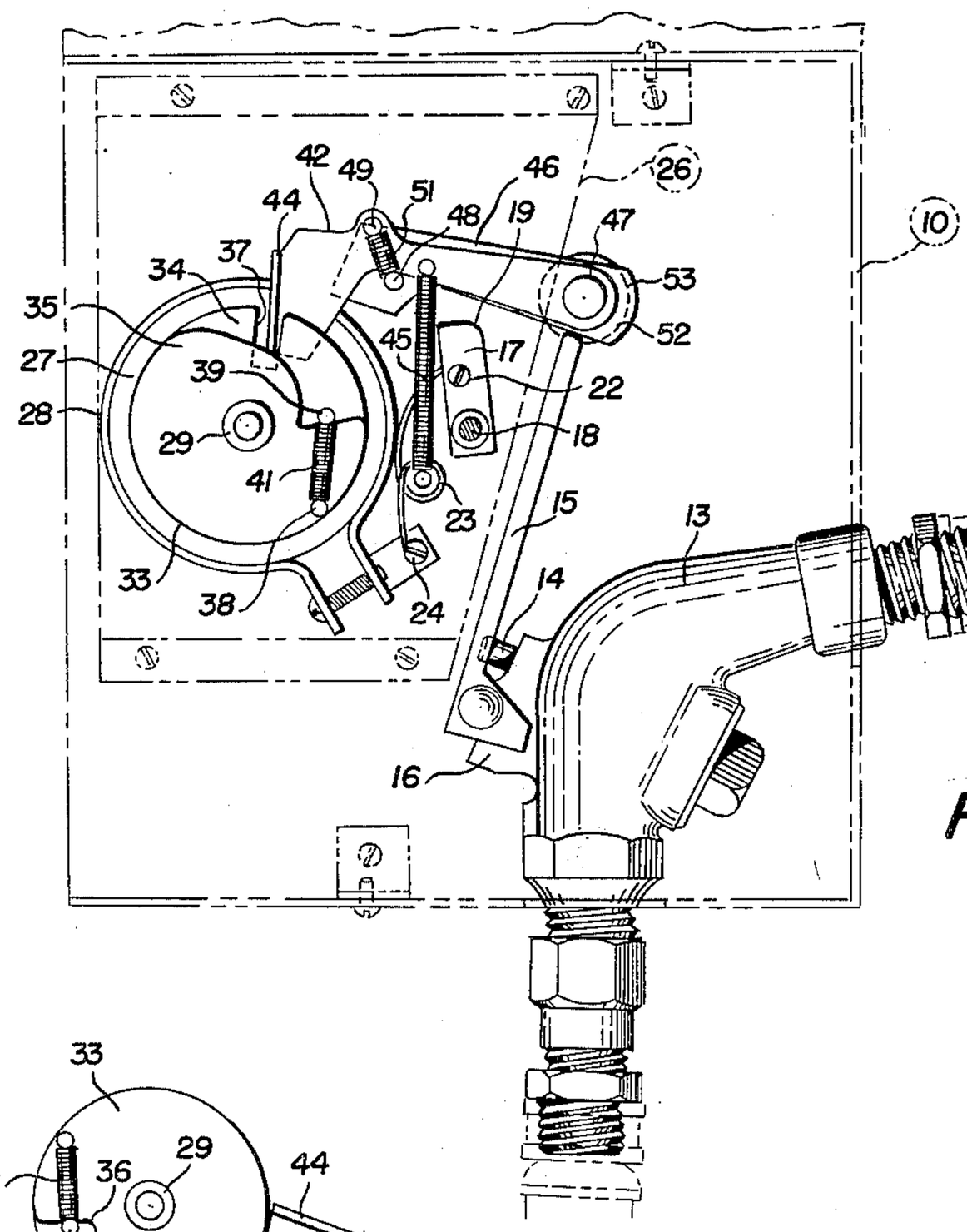

Fig. 2

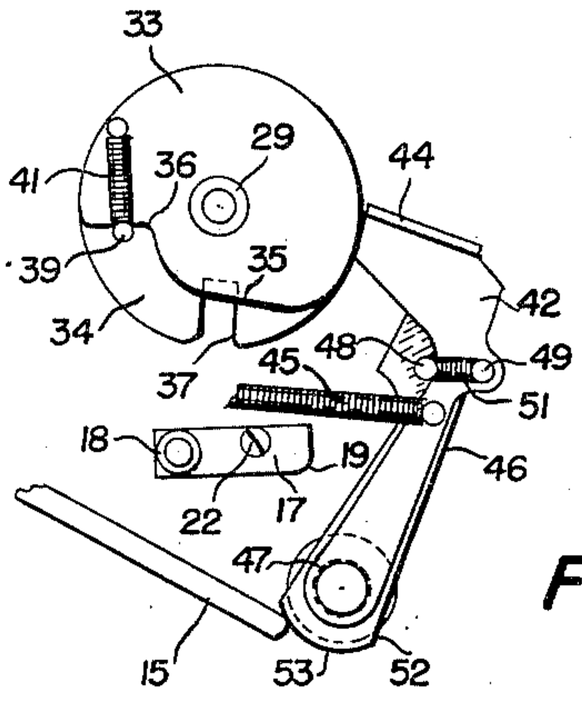

Fig. 7

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VALVE TIMER

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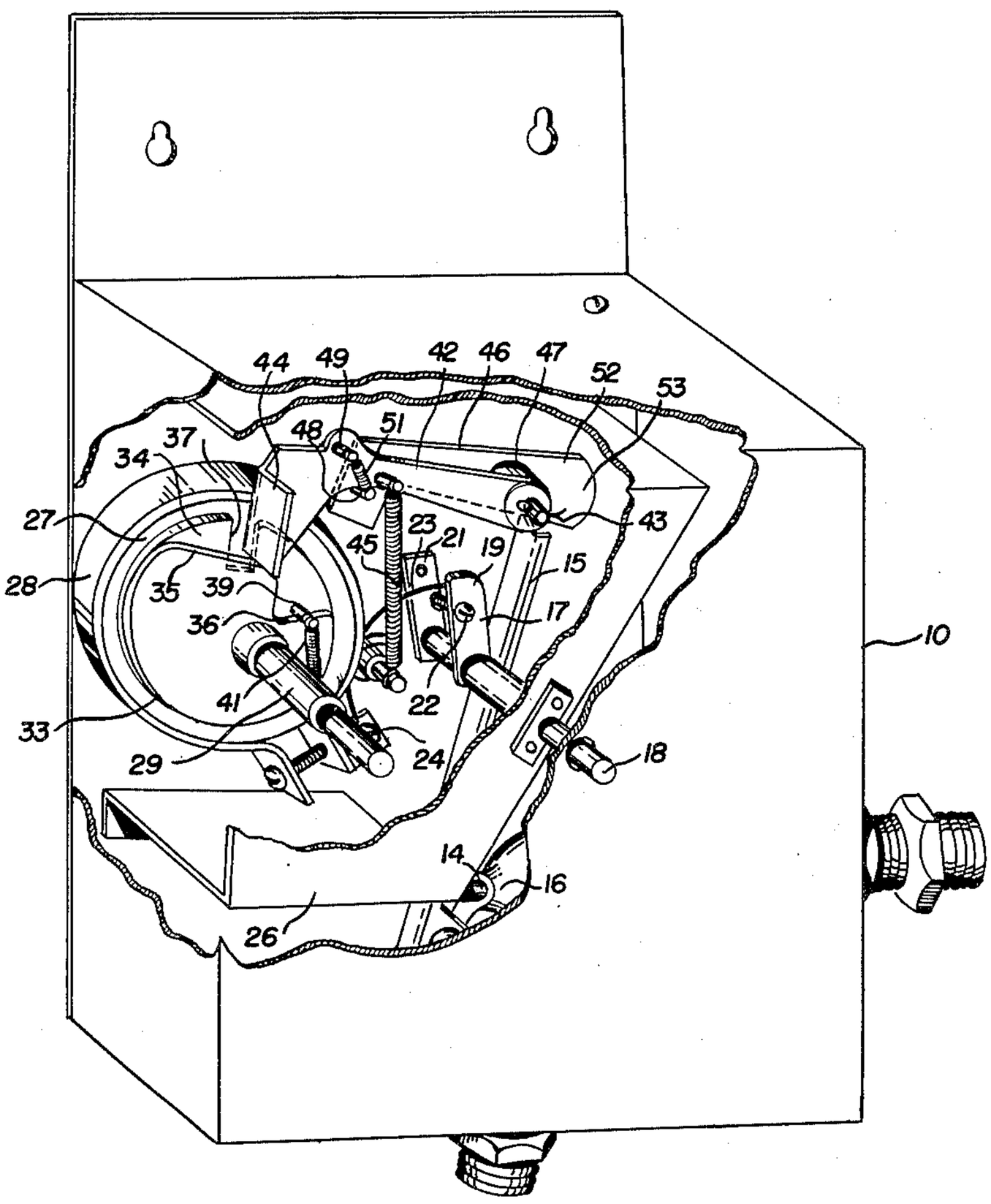

Fig. 4

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VALVE TIMER

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Application March 23, 1950, Serial No. 151,330

13 Claims. (Cl. 161—7)

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This invention relates to valve timers for the automatic control of fluid flow in water lines, gas lines and the like. Although not limited thereto, the invention has especial utility in domestic water sprinkling systems, being easy to install and operate and relatively simple and inexpensive of construction.

The object of the invention is to simplify the construction as well as the means and mode of operation of valve timers as disclosed herein, whereby such timers may not only be economically manufactured, but will be more efficient and accurate in use, adaptable to a wide variety of applications, having relatively few parts and be unlikely to get out of repair.

Another object of the invention is to utilize in effective manner a clock mechanism and intermediate control to obtain a quick automatic closure action of a valve.

A further object of the invention is to reduce the manipulative adjustments required in operation of the timer to a minimum and to obviate the need for special care in the exercise of such adjustments.

Still another object of the invention is to incorporate the timer in a unitary package which can be connected and disconnected in the system at will and removably mounted at any point found most convenient.

A further object of the invention is to provide a valve timer possessing the advantageous structural features, the inherent meritorious characteristics and the mode of operation herein mentioned.

With the above primary and other incidental objects in view as will more fully appear in the specification, the invention intended to be protected by Letters Patent consists of the features of construction, the parts and combinations thereof, and the mode of operation, as hereinafter described or illustrated in the accompanying drawings, or their equivalents.

Referring to the accompanying drawing, wherein is found the preferred but obviously not necessarily the only form of embodiment of the invention,

Fig. 1 is a perspective view of a valve timer unit in accordance with the instant invention;

Fig. 2 is a view of the valve timer and valve in front elevation, the housing of the unit being indicated diagrammatically;

Fig. 3 is a top plan view of the apparatus of Fig. 2;

Fig. 4 is a view similar to Fig. 1, with part of the housing broken away to show the timer mechanism;

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Fig. 5 is a detail view in elevation showing the position of the parts as the lock mechanism is being set to begin a cycle of operation;

Fig. 6 is a view similar to Fig. 5, showing the position of the parts after the clock mechanism has been set and during opening of the valve; and

Fig. 7 is a view similar to Figs. 5 and 6, showing the position of the parts after the valve has been opened and latched in open position.

Like parts are indicated by similar characters of reference throughout the several views.

The invention is disclosed as embodied in a water sprinkling system. As such it includes, as shown in Fig. 1, a weather sealed housing 10 constructed and arranged to be removably mounted in a convenient location, as for example, adjacent the sill cock conventionally provided in homes.

At the side and bottom of the housing 10 are hose connectors 11 and 12 which may serve respectively as the water inlet and the water outlet. The connectors 11 and 12 extend into the interior of the housing where they communicate with the opposite ends of a curved valve body 13. The body 13 is a conventional, commercially available unit which is interiorly partitioned for alternative flow of water therethrough under control of a poppet valve having an externally projecting stem 14. A spring (not shown) in the valve body holds the poppet valve normally closed, urging stem 14 outward. An axial inward pressure upon the stem 14 will overcome the spring and open the poppet valve to permit flow between the fittings 11 and 12. Release of such pressure restores the valve to control of the spring which closes the valve and cuts off flow between the fittings 11 and 12.

Axial inward motion of the stem 14 is accomplished by a depressible valve actuating lever 15 pivotally connected to an ear 16 on the body 13 and extending in overlying relation to the stem 14 upwardly in the housing 10. The arrangement of the lever 15 is such that rotation thereof in a clockwise direction, as viewed in Fig. 2, will actuate stem 14 to permit flow through the valve body 13. Such motion of the lever 15 is obtained through an arm 17 fast on a shaft 18 and formed with a cam surface 19 to engage and depress the lever 15 in response to a clockwise rocking motion of the shaft 18. As shown in Fig. 4, there is also fast on the shaft 18 an arm 21 spaced from arm 17 and connected thereto by a screw stud 22. A hair spring 23 connected to stud 22 and anchored at 24 to the housing 10, yieldingly maintains the arm 17 in the normal substantially erect position of Fig. 4.

The shaft 18 is journaled in the front and rear walls of housing 10. It projects through the front wall thereof and has secured to its outwardly projecting end a pointer 25 (Fig. 1). The pointer 25 is accordingly presented for manual operation, and when in a clockwise direction oscillates the arm 17 into contact with lever 15 to depress the lever and open flow through the valve body 13. Upon release thereof, the pointer, shaft 18 and associated parts return from actuated position under the influence of spring 23.

Also contained in housing 10 is a cover plate 26 having inturned upper and lower ends fastened to the rear wall of housing 10. The plate 26 is spaced from the front wall of housing 10 and provides a further bearing for shaft 18 which is passed therethrough. The cover plate 26 substantially encloses apparatus for controlling the return of valve actuating lever 15 from depressed position. Such apparatus includes a clock mechanism 27 contained by a clamp 28 and comprising conventional spring and escapement elements not here shown. The clock mechanism 27 is connected to a shaft 29 which has a bearing in plate 26 and extends out of housing 10 through the front wall thereof. Secured to the projecting end of the shaft 29 is a pointer 31 (Fig. 1), arranged to traverse a dial 32 on the front face of the housing 10 and calibrated in terms of minutes. According to the construction and arrangement of this assembly of parts, therefore, pointer 31 may be turned in a clockwise direction to effect a corresponding motion of shaft 29 and wind the clock mechanism 27. When the pointer has been turned to a desired place on the dial 32 it is released and will be returned slowly in a reverse direction under control of the clock mechanism which defines a normal position for the pointer at zero on the dial.

Referring to Figs. 2 and 4, there is further mounted on shaft 29, within cover plate 26, a cam assembly including a cam 33 fast on the shaft and a cam 34 loose on the shaft. The cam 33 is cut away to present an inclined shoulder 35 and a right angle shoulder 36 while cam 34 is disc shaped except for a radial slot 37 in the periphery thereof. The cams 33 and 34 occupy adjacent side-by-side positions on the shaft 29 and have respective longitudinal studs 38 and 39 set therein between which is stretched a tension spring 41. Under the influence of spring 41, the cams 33 and 34 have a normal relation one to another in which stud 39 on cam 34 abuts shoulder 36 on cam 33 and in which slot 37 on cam 34 lies opposite the base of shoulder 35 on cam 33. The parts will tend to maintain this relation during rotary movements of the shaft 29, driving cam 33, by reason of spring 41 and by reason of the engagement of shoulder 36 with stud 39.

Cooperable with the cams 33 and 34 is an arm 42 pivotally mounted on a stub shaft 43 extending from the rear wall of housing 10. The outer or free end of arm 42 has a turned over lug 44 acting as a follower with respect to the cams 33 and 34 and held in cooperative relation therewith by a tension spring 45 urging arm 42 in a counter-clockwise direction as seen in Fig. 2. The lug 44 is arranged to be received in slot 37 of cams 34 and thereby to ride on shoulder 35 of cam 33. It will, when received in slot 37, restrain cam 34 from following the motions of cam 33 and shaft 29. In response

to rotation of shaft 29 and cam 33 in a clockwise direction, therefore, cam 33 will move independently of cam 34, tensioning spring 41, until shoulder 35 raises lug 44 sufficiently to move it out of slot 37. When this occurs, cam 34 will rotate quickly in a following direction, under the urging of spring 41, until arrested by contact of stud 39 with the shoulder 36. In the course of this motion slot 37 is moved out of cooperative relation with lug 44 which is compelled now to ride on the peripheries of the cams 33 and 34. Accordingly, arm 42 is held in the position to which it was rocked by the initial relative turning movement of the cam 33. In the reverse movement of shaft 29, under control of clock mechanism 27, cams 33 and 34 return as a unit toward starting position as shoulder 36 on cam 33 acts on stud 39 on cam 34. The arm 42 will retain its rocked position during this return motion but as the cams reach starting position slot 37 is returned to cooperative relation with lug 44 whereupon the lug drops into the slot as arm 42 is restored to normal by spring 45.

The arm 42 may be called a control member since its rocking motions by cams 33 and 34 are utilized in the control of a latch arm 46 cooperable with the valve actuating lever 15. The arm 46 is arranged alongside arm 42, being pivotally mounted on the stub shaft 43 and separated from arm 42 by a bushing 47. One end of the arm 46 projects alongside arm 42 and has an enlarged head portion in which is set a stud 48 projecting laterally in underlying relation to the edge of arm 42. A similar stud 49 is set in arm 42 and there is stretched between the studs 48 and 49 a tension spring 51. The spring 51 is normally deenergized, exerting no substantial influence on arm 46. The opposite end of arm 46 projects as a finger 52 in the opposite direction from mounting shaft 43 and presents a curved cam surface 53 at its extremity.

As shown in Figs. 2 and 6, the outer end of the valve actuating lever 15 lies in approximately contacting relation to the latch finger 52. Accordingly when control arm 42 is rocked outward by cam 33, arm 46 is prevented from immediately following such motion and spring 51 is energized or stretched. Now, however, if lever 15 is depressed to actuating position the outer end thereof passes beneath finger 52 and arm 46 is allowed to follow arm 42. In the course of such motion, the cam surface 53 on finger 52 will swing into overlying relation to the lever 15, preventing its return from actuated position. Release of lever 15 is accomplished when lug 44 on arm 42 drops into slot 37 at the end of the return travel of cams 33 and 34. When this action takes place, the motion of arm 42 as effected by spring 45 is transmitted through stud 48 to latch arm 46, rocking this arm in a counter-clockwise direction as viewed in Fig. 2 and moving finger 52 out of overlying relation to lever 15. The lever will rise by virtue of the spring force (not shown) incorporated in valve body 13 and working through valve stem 14.

In the operation of the valve timer, the parts normally occupy the positions shown in Figs. 1 to 4 with the cams 33 and 34 in starting position and latch arm 46 blocked by valve actuating lever 15 which is in its non-depressed position. In initiating operation of the device, pointer 31 is turned in a clockwise direction from zero to a position on dial 32 corresponding to the number

of minutes it is desired to keep the sprinkling system in operation. Since pointer 31 is secured to shaft 29, the shaft moves a similar distance in a clockwise direction to set or wind the clock mechanism 27 and to rotate cam 33. The rise of shoulder 35 on cam 33 is quite steep so that the initial result of turning cam 33 is to move lug 44 out of slot 37, rocking arm 42 to tension spring 51 and so condition latch arm 46 for operation. This is the position of the parts illustrated in Fig. 5, and it will be understood that immediately upon camming of the lug 44 out of slot 37, the cam 34 follows cam 33, under the influence of spring 41, to assume the position shown in Fig. 6. After pointer 31 has been adjusted and released, pointer 25 is turned in a clockwise direction to depress lever 15. In Fig. 6, the actuating travel of pointer 25 has been nearly completed. Arm 17 on the pointer shaft 18 has contacted lever 15 and moved it to the outer edge of finger 52 on latch arm 46. In Fig. 7, actuation of the pointer 25 has been completed and it has been released and restored to normal position by spring 23. In completing the actuating motion, lever 15 has been moved beneath the plane of finger 52, allowing latch arm 46 to rock under the influence of spring 51. In response to such movement, cam surface 53 on finger 52 swings into engaging, overlying relation with the lever 15 to complete depression of the lever if additional motion is needed and to retain the lever in depressed actuated position.

The subsequent operation of the device is under control of the clock mechanism 27 which returns the cams 33 and 34 slowly in a counterclockwise direction, as viewed in Fig. 7. When slot 37 in cam 34 reaches cooperative relation with lug 44, control arm 42 rocks leftward, and acting through stud 48, carries arm 46 with it to release lever 15. By virtue of the abrupt entrance of lug 44 into slot 37 the release of lever 15 and closing of the valve in body 13 is a snap action insuring quick, full closure.

From the above description it will be apparent that there is thus provided a device of the character described possessing the particular features of advantage before enumerated as desirable, but which obviously is susceptible of modification in its form, proportions, detail construction and arrangement of parts without departing from the principle involved or sacrificing any of its advantages.

While in order to comply with the statute the invention has been described in language more or less specific as to structural features, it is to be understood that the invention is not limited to the specific features shown, but that the means and construction herein disclosed comprise but one of several modes of putting the invention into effect.

Having thus described my invention, I claim:

1. A valve timer, including a valve actuating arm, actuating means for said arm, a normally ineffective latch for holding said arm in actuated position, tension means for rendering said latch effective, a timing mechanism, means for setting said timing mechanism, and means operable by said last named means for activating said tension means and operable by said timing mechanism to release said tension means.

2. A valve timer, including a valve actuating arm, means for latching said arm in actuated position, a timing mechanism, means for setting said timing mechanism, resilient means tensioned by said last named means and released by said timing mechanism for rendering said latch means effective and ineffective, and actuating means for said valve actuating arm.

3. A valve timer, including a depressible valve control arm, a latch to engage and hold said arm in depressed position and held out of engaging position by said arm in the non-depressed position thereof, a normally untensioned spring urging said latch to engaging position, a timing mechanism, means for setting said timing mechanism, means operable by said last named means to tension said spring and operable under control of said timing mechanism to release the tension of said spring and to move said latch out of engaging position, and means for depressing said valve control arm.

4. A valve timer, including a depressible valve control arm, a latch assembly including a latch for said arm and a control member for said latch, said latch being held out of engaging position by said arm in the non-depressed position thereof, spring means interconnecting said latch and said control member and tensioned by movement of said control member in one direction to urge said latch to engaging position, means operable by said control member in the opposite direction of motion thereof to move said latch out of engaging position, a spring urging said control member in said opposite direction, means for moving said control member in said one direction, a timing mechanism settable by said last named means and releasing said control member for motion in said opposite direction, and means for depressing said valve control arm.

5. A valve timer, including a depressible valve control arm, a latch to engage and hold said arm in depressed position, a spring urging said latch to engaging position, a control member movable to energize and deenergize said spring, a cam for controlling the movements of said control member, a timing mechanism, means for turning said cam in response to operation of said timing mechanism, and means for depressing said valve control arm.

6. A valve timer, including a depressible valve control arm, a latch to engage and hold said arm in depressed position, a spring urging said latch to engaging position, a clock mechanism, a shaft manually rotatable in one direction to wind said clock mechanism and rotated in the opposite direction by said clock mechanism in response to the unwinding thereof, cam means operated by said shaft, a control member operable by said cam means to energize said spring during the winding of said clock mechanism and to deenergize said spring and move said latch out of engaging position upon unwinding of said clock mechanism, and means for depressing said arm.

7. A valve timer, including a depressible valve control arm, means for depressing said arm, a pivotal latch arranged to swing into overlying relation to said arm when depressed, biasing means normally urging said latch into overlying position relative to said arm, said latch being held out of such position by said arm while in its non-depressed position, a control member movable in one direction to tension said spring and movable in the opposite direction to move said latch out of overlying position, cam means having motion in opposed senses to control the motion of said control member, and a timer mechanism for operating said cam means through at least one of said opposed senses.

8. A valve timer according to claim 7, characterized in that said cam means is moved manually in a first of said opposed senses and moved by said timer mechanism in a second of said opposed senses.

9. A valve timer, including a depressible valve control arm, a latch to engage and hold said arm in depressed position, said latch being held out of engaging position by said arm in the non-depressed position thereof, a latch control member arranged alongside said latch, cooperating portions on said member and said latch to disable said latch in response to motion of said member in one direction, a spring interconnecting said member and said latch and tensioned by motion of said member in the opposite direction whereby said latch will follow the motion of said member after being released by said arm and move to engaging position with respect to said arm, cam means controlling movements of said control member in said opposed senses in accordance with and in timed relation to opposed movements of said cam means, manual and automatic means for effecting the respective opposed movements of said cam means, and manual means for depressing said valve actuating arm.

10. A valve timer according to claim 9, characterized in that said cam means includes a cam shaft to be turned in one direction by hand and to be turned in the opposite direction by an antomatic timer mechanism, a first cam fixed to said shaft, a second cam loose on said shaft and presenting a recess, a follower on said control member to be received in said recess, and a spring interconnecting said cams, the construction and arrangement being such that rotation of said first cam in said one direction moves said follower out of said recess permitting said second cam to follow the motion of said first cam, said cams returning in said opposite direction as a unit until said follower again drops into said recess.

11. A valve timer, including a depressible valve actuating arm, means for depressing said

arm, a latch for engaging and holding said arm in depressed position, a normally untensioned spring urging said latch to engaging position, a pivotally movable level for tensioning and untensioning said spring, a timing mechanism, cam means operable by and in conjunction with said timing mechanism for controlling the movements of said lever, and lever operated means for moving said latch out of engaging position.

12. A valve timer, including a depressible valve actuating arm, a pivotally movable latch for engaging and holding said arm in depressed position, said latch being blocked by said arm in the non-depressed position thereof from moving to engaging position, a pivotally movable lever in side by side relation to said latch, a normally untensioned spring interconnecting said latch and said lever, cam means having motion in opposed senses to effect rocking of said lever and thereby the tensioning and untensioning of said spring, timer mechanism for operating said cam means through at least one of its opposed senses, and means for depressing said valve actuating arm.

13. A valve timer according to claim 12, characterized by means on said lever operable to move said latch out of engaging position as part of and in conjunction with the movement of said lever to untension said spring.

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