

Oct. 29, 1963

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3,108,609

WATER TIMING DISTRIBUTING VALVE

Filed April 17, 1962

2 Sheets-Sheet 1

Fig 1

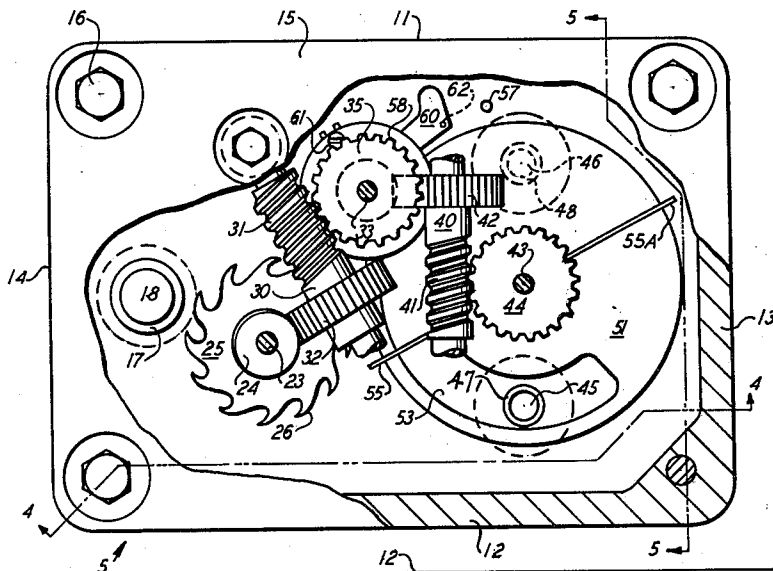


Fig 2

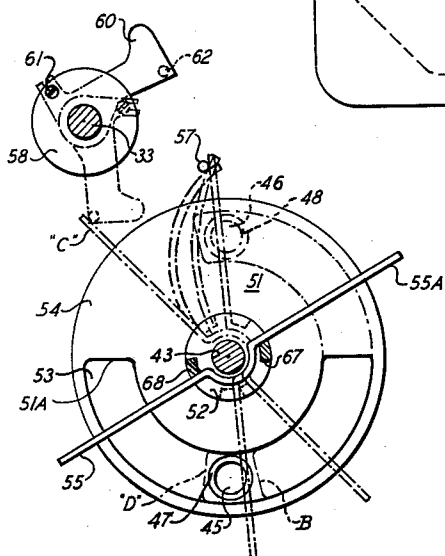
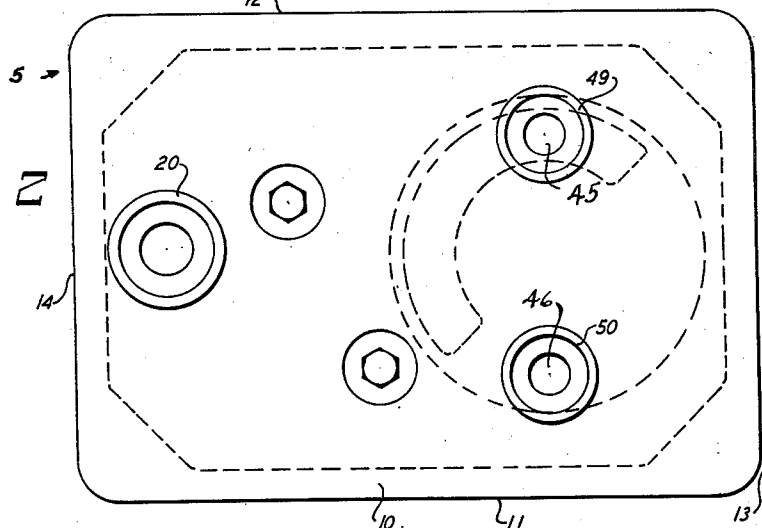


Fig 3

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2 Sheets-Sheet 2

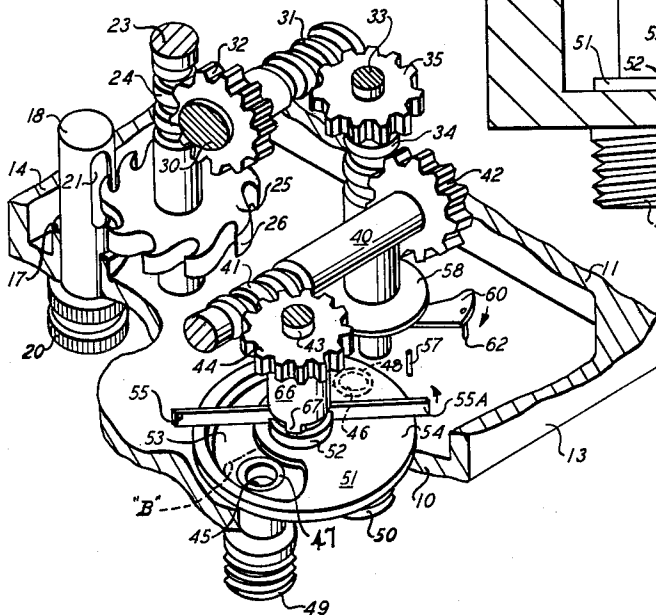
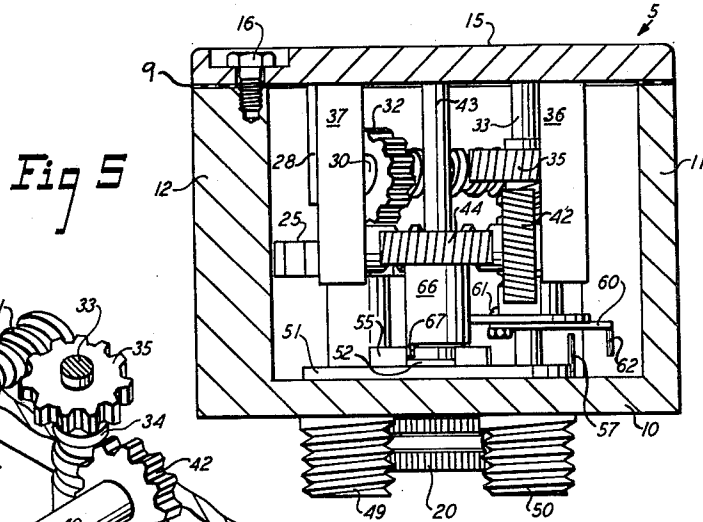
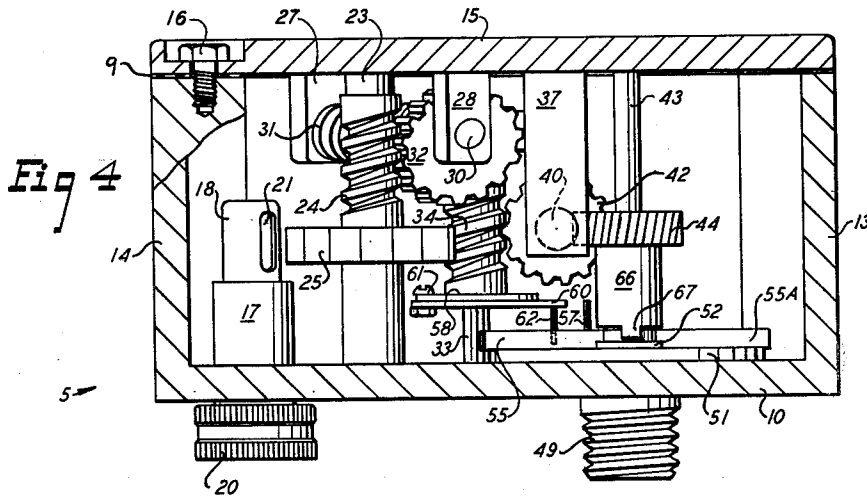


Fig 6

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3,108,609
WATER TIMING DISTRIBUTING VALVE
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This invention relates to a water timing distributing valve and more particularly to a valve which services a plurality of water outlets in timed relation to a water inlet.

An object of the present invention is to provide the distribution of water from a single source of supply to a plurality of outlets in such a manner that an intermittent supply is delivered alternately to each, at full pressure, without the reduction of pressure which would occur if the supply were constantly distributed among all the outlets at the same time.

In many communities the available water pressure is insufficient to permit simultaneous operation of a plurality of lawn sprinklers for example, or other water-using apparatus, without undesirable loss of head or pressure. Accordingly a preferred application of the present invention is applied to a plurality of lawn sprinklers in such a manner that the full pressure of the supply is successively furnished each sprinkler individually, while the others remain idle. An important advantage of the present construction resides in the fact that full pressure is made available, even though many outlets may be in service.

Another object of the present invention is to provide means whereby the pressure of the water supply is utilized to operate the automatic valving means.

Still another object of the present invention is to provide automatic valving means which instantaneously shuts off the water to one outlet while instantaneously turning on the water to another outlet to prevent an excess amount of water from falling on one section of a lawn at a given time.

And still another object of the present invention is to provide a water timing distributing valve which is fool-proof in operation, economical to operate in an entirely automatic manner.

Other objects of the present invention will become apparent in part and be pointed out in part in the following specification and claims.

Like reference numerals refer to like parts in the accompanying drawings in which:

FIGURE 1 is a top plan view, with a section of the cover broken away for clarity, of the new and improved water timing distributing valve.

FIGURE 2 is a bottom plan view of FIGURE 1.

FIGURE 3 is a diagrammatic view illustrating the valve mechanism.

FIGURE 4 is a vertical cross sectional view taken on line 4-4 of FIGURE 1.

FIGURE 5 is a vertical cross sectional view taken on line 5-5 of FIGURE 1.

FIGURE 6 is a perspective view of the water timing distributing valve mechanism with the casing broken away.

Referring to the drawings: a casing generally indicated by reference character 5 is provided consisting of a bottom 10, a front 11, a back 12, a right side 13 and a left side 14. Preferably, this casing is molded as a water tight unitary structure. A top 15 is secured to the casing by means of screws 16 to form a water chamber. A gasket 9 may be provided between top 15 and front 11, back 12 and sides 13, 14.

Bottom 10 is provided with a hollow pad 17. A water inlet 18 is fixed in hollow pad 17 by means of a

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press fit, and is provided with a threaded coupling 20, and a single elongated port 21.

A drive shaft 23 provided with a worm gear 24 is rotatively mounted on one end in bottom 10 and on the other end in top 15. A water actuated impeller 25 fixed to drive shaft 23 is provided with vanes 26. Two brackets 27, 28 integrally formed in top 15 project downwardly and are diametrically opposite to each other. A shaft 30 provided with a worm gear 31 is rotatively mounted on opposite ends in brackets 27, 28. A worm wheel 32 is fixed to shaft 30 and is adapted to be rotated by worm gear 24. An intermediate shaft 33 having a worm gear 34 is rotatively mounted on one end in bottom 10 and on the other end in top 15. A worm wheel 35 is fixed to intermediate shaft 33 and is adapted to be driven by worm gear 31. Two arms 36, 37 integrally formed in top 15, project downwardly in parallel relationship. A shaft 40 provided with a worm gear 41 is rotatively mounted on opposite ends in arms 36, 37. A worm wheel 42 fixed to shaft 40 engages to be driven by worm gear 34. A driven shaft 43 is rotatively mounted on one end in bottom 10 and on the other end in top 15. A worm wheel 44 fixed to driven shaft 43 engages to be driven by worm gear 41.

Bottom 10 is provided with a plurality of exit ports, illustrated as two in number, 45, 46. Garden hose couplings having metal ferrules 47, 48 which are fastened in bottom 10 at ports 45, 46 respectively, are provided with threaded areas 49, 50, respectively.

A disk or valve plate 51 provided with a hub 52, an arcuate shaft or valve opening 53 and a port blocking portion 54 is mounted for independent rotation on shaft 43. In the application of two exit ports such as 45, 46, arcuate slot or valve opening 53 and port blocking portion 54 equally divide the circumference of disk or valve plate 51 so as to comprise one hundred eighty degrees each. A flexible strip 55 which is greater in length than the diameter of disk 51 is fastened in hub 52 so as to freely rotate disk 51 on shaft 43. A pin 57 is secured in bottom 10. A collar 58 is secured to shaft 33. A finger 60 is pivotally mounted on shaft 33. A screw 61 fastens one end of finger 60 to collar 58 so that finger 60 will rotate with shaft 33. A projection 62 extends downwardly from finger 60 and is adapted to engage and rotatively push flexible strip 55 as will presently appear. A clutch sleeve 66 provided with two teeth 67, 68 is fastened to shaft 43. Teeth 67, 68 are adapted to engage and rotate flexible strip 55.

In operation a source of water supply will be connected to water inlet 18 through threaded coupling 20. Water under pressure will pass through water inlet 18 and out of single elongated port 21. The water will strike the vanes 26 of water actuated impeller 25 and thereby rotate drive shaft 23 and worm gear 24. Worm gear 24 will rotate worm wheel 32, shaft 30 and worm gear 31. Worm gear 31 will rotate worm wheel 35, intermediate shaft 33, worm gear 34, worm wheel 42, shaft 40, worm gear 41, worm wheel 44 and driven shaft 43.

What has just been described is a gear train, initially powered by a water actuated impeller 25 which may turn at eight hundred revolutions per minute. The gear train will reduce this initial speed to one revolution per hour at driven shaft 43. It is obvious, that by changing the gear ratios, such as between worm gear 31 and worm wheel 35, the speed of shaft 43 may be increased or decreased. Thus the gear train is a timing device because it rotates driven shaft 43 in timed relation to the rotation of water actuated impeller 25. The rotation of vanes 26 can be increased or decreased by rotating water inlet 18 so that the stream of water projecting from single elongated port 21 is directed fully or partially on vanes 26.

Driven shaft 43 will rotate clutch sleeve 66 and thereby teeth 67, 68 into engagement with flexible strip 55 whereby disk or valve plate 51 will be rotated until flexible strip 55 engages pin 57. Driven shaft 43 will continue to rotate. Teeth 67, 68 will continue to press against flexible strip 55, whereby flexible strip 55 is brought under increasing stress. The flexible strip bends or bows with the arc of the bow increasing as the stress increases (see FIGURE 3). However, disk 51 imperceptibly rotates. Suddenly flexible strip 55 snaps past pin 57 to position "C" whereby wall 51A of disk or valve plate 51 will snap from position "D" to position "B." In this manner port 45 is closed to the water in casing 5 and port 46 is opened to the water in casing 5. Projection 62 will engage to pivot flexible strip 55 a predetermined distance to insure that valve plate 51 registers valve opening 53 with port 46 while simultaneously closing port 45.

It is intended that the snapping action of flexible strip 55 will cause valve opening 53 to snap into engagement with one port and out of engagement with the other port. Finger 60 is insurance that valve opening 53 fully registers with port 46.

It is to be observed that intermediate shaft 33 and finger 60 rotate more rapidly than driven shaft 43 due to the nature of the gear train. Thus finger 60 passes the dot and dash position shown in FIGURE 3 many times in relation to the rotation of flexible strip 55.

The rotation of disk 51 by finger 60 advances flexible strip 55 ahead of teeth 67, 68. Continued rotation of driven shaft 43 eventually rotates teeth 67, 68 into engagement with flexible strip 55, whereby the cycle previously described, is repeated.

Having shown and described a preferred embodiment of the present invention by way of example, it should be realized that structural changes could be made and other examples given without departing from either the spirit or scope of this invention.

What I claim is:

1. A water timing distributing valve consisting of a casing provided with a water chamber, a water inlet, provided with a single elongated port, fixed in said casing, a driving shaft rotatively mounted in said casing, a water actuated impeller, having vanes, fixed to said driving shaft with said vanes aligned with said single elongated port, an intermediate shaft rotatively mounted in said casing, a finger, provided with a projection, secured to said intermediate shaft and rotatable therewith, gear means rotatively connecting said driving shaft with said intermediate shaft, a driven shaft rotatively mounted in said casing, a clutch sleeve, having oppositely located teeth for periodically engaging a flexible strip, fixed to said driven shaft, gear means rotatively connecting said intermediate shaft with said driven shaft, two outlet ports located in said casing one hundred eighty degrees apart and on opposite sides of said driven shaft, a disk, provided with an arcuate slot one hundred eighty degrees in length and having a hub, mounted for independent rotation upon said driven shaft, and overlying said two ports with said arcuate slot in register with one of said two outlet ports, a flexible strip, greater in length than the diameter, of said disk, fixed in said hub and periodically engaged by said teeth, a pin fixed in said casing adjacent said disk within the path of travel of said flexible strip whereby rotation of said driven shaft rotates said disk and said flexible strip

against said pin through said teeth until said flexible strip acquires enough pressure to snap past said pin and be engaged and rotated by said projection a distance sufficient to rotate said arcuate slot out of register with one of said two outlet ports and into register with the other of said two outlet ports.

2. A water timing distributing valve consisting of a casing having a water chamber, a water inlet, a driving shaft, provided with a water actuated impeller, rotatively mounted in said casing with said water actuated impeller aligned with said water inlet, a driven shaft rotatively mounted in said casing, a clutch sleeve, provided with a single tooth, fixed to said driven shaft, drive means connecting said driving shaft with said driven shaft, a plurality of outlet ports in said casing, a valve plate, provided with a valve opening, mounted for independent rotation upon said driven shaft, said valve plate overlying said plurality of ports with said valve opening in register with one of said plurality of ports, a flexible strip fixed to said valve plate, a pin fixed in said casing adjacent said valve plate and within the path of travel of said flexible strip, said tooth rotatively engageable with said flexible strip, whereby rotation of said driven shaft rotates said clutch sleeve tooth against said flexible strip to tension and bow said flexible strip against said pin until said flexible strip snaps past said pin thereby to rotate said valve plate and said valve opening into register with one of said plurality of ports and out of register with another of said plurality of ports.

3. A water timing distributing valve comprising a casing having a water chamber, a water inlet, a plurality of outlet ports located in one wall of said casing, a valve plate provided with a valve opening mounted on a driven shaft for independent rotation thereon and overlying said plurality of ports, with said opening in register with one of said plurality of ports, a flexible strip fixed to said plate with its ends extending beyond the periphery of said plate, a pin fixed in said casing adjacent said plate, a clutch sleeve mounted on said driven shaft, said sleeve having teeth thereon for periodically engaging said flexible strip, as said shaft rotates and thereby tensioning said strip against and past said pin, an intermediate shaft adjacent said plate provided with a finger having a projection extending therefrom, said intermediate shaft being rotatably mounted in said casing, means for rotatively connecting said intermediate and driven shafts, said projection being rotatable with said intermediate shaft, the rotation of said intermediate and driven shafts being correlated to engage said projection with said flexible strip after said strip rotates past said pin and thus rotate said valve plate a sufficient distance to move said valve opening out of register with one of said plurality of outlet ports and into register with another of said plurality of outlet ports, a driving shaft provided with a water actuated impeller rotatively mounted in said casing with said impeller aligned with said water inlet and drive means rotatively connecting said drive and intermediate shafts.

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