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TIMED VALVE

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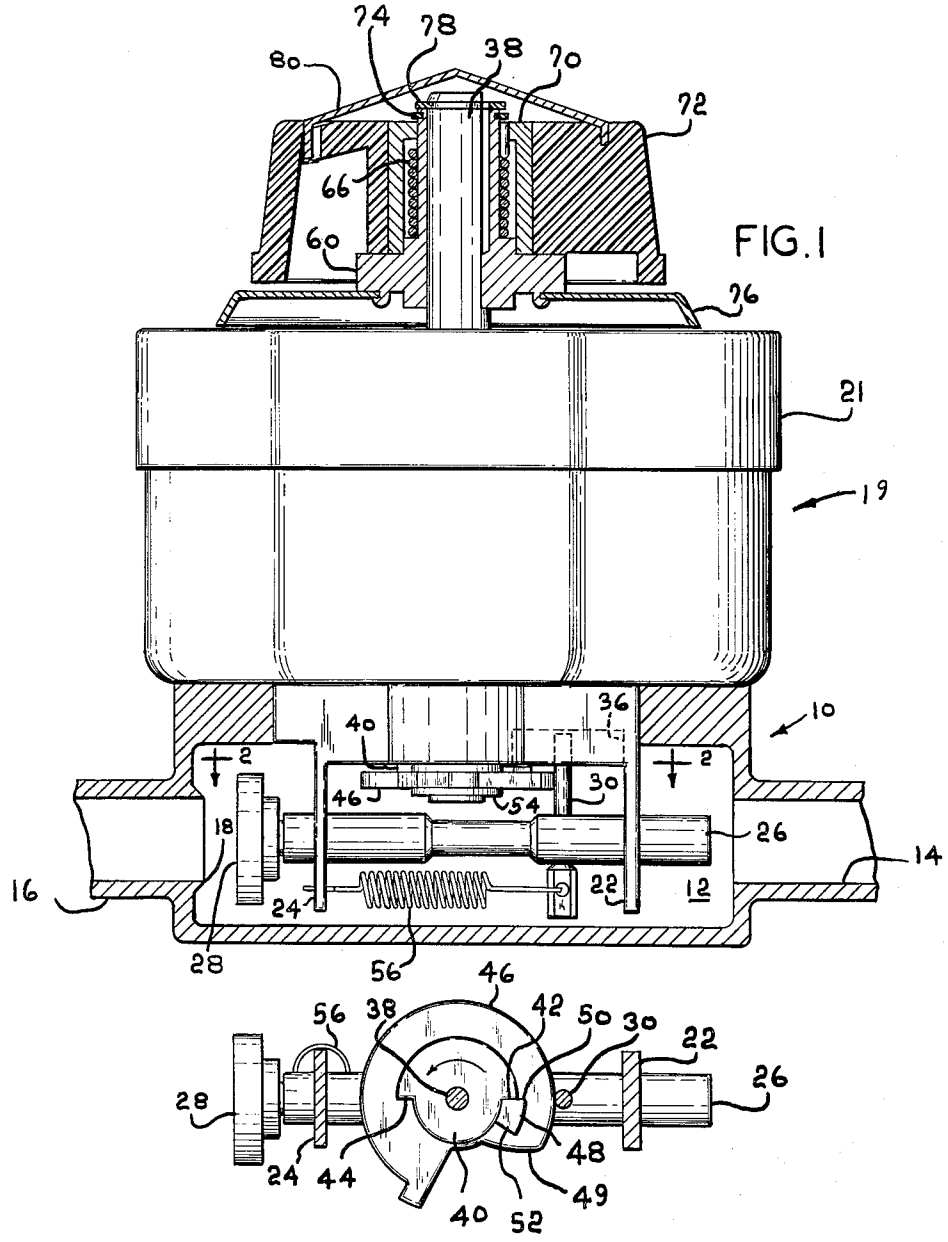

FIG. 1

FIG. 2

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TIMED VALVE

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This invention relates to a clock controlled gas valve.

Timed valves are commonly used on gas fired incinerators and a major problem with existing timed valves is that, although the incinerator maker recommends an optimum time for burner operation, many people close the valve prematurely in order to save gas. This "short cycling" results in incomplete combustion of such things as wet garbage. At this point the incinerator owner concludes that the incinerator does not work and blames the manufacturer. It is the object of this invention to provide a tamper-proof valve which cannot be "short cycled."

This object is attained by both connecting the timer to the valve so that the valve cannot be opened until the timer has been set for substantially a full cycle and connecting the manually operated knob to the timer shaft through a one-way clutch which only permits the timer shaft to be turned in the valve opening direction. The valve cannot be "short cycled" since the full time cycle must be set to open the valve and the time cycle cannot thereafter be shortened since reverse operation of the knob is ineffective.

Other objects and advantages will be pointed out in, or be apparent from, the specification and claims as will obvious modifications of the single embodiment shown in the drawings in which:

FIG. 1 is a sectional view of the clock controlled valve assembly; and

FIG. 2 is a fragmentary sectional view taken on line 2—2 of FIG. 1 showing the position of the drive member and cam when the timer is fully wound and the valve is open.

Referring to the drawings in detail, FIG. 1 shows the entire clock controlled valve in which a timer mechanism controls the time when the valve is open. Valve body 10 has chamber 12 provided with an inlet 14 and an outlet 16.

The valve mechanism is mounted on ears 22 and 24 which project from the bottom of the time housing 19 into chamber 12 and have aligned openings in which valve stem 26 is reciprocably mounted. Valve 28 is carried on one end of stem 26 to cooperate with valve seat 18 to control flow through the outlet. Follower pin 30 is screwed into a threaded hole in stem 26 so that a hexagonal portion projects on one side of stem 26 and serves as an anchor for spring 56 the other end of which connects to ear 24 with the spring biasing the valve to its seat and also biasing the follower against cam 46. The upper end of pin 30 is received in a guide slot 36 so that valve stem 26 can reciprocate but not rotate.

The valve cocking and actuating portion of this invention comprises a timer driven shaft 38 extending into chamber 12 having a fixed drive member 40 and a rotatable cam 46 mounted on it. Snap ring 54 in the groove on the lower end of shaft 38 retains cam 46 on the shaft. The drive member has a cock surface 42 designed to engage side 50 of abutment 48 projecting from cam 46 so that when shaft 38 is rotated substantially to a full timer cycle setting drive member 40 picks up cam 46 and causes follower 30, biased into engagement with the cam, to ride up cam drop 49 to open the valve. (This cocked position is shown in FIG. 2.) Drive member 40 also has a drive surface 44 which engages side 52 of abutment 48 after the timer has run substantially its entire cycle. Shortly after member 40 picks up cam 46, follower 30 reaches

drop 49 and follower 30 is free to fall rapidly over the drop under the bias of spring 56.

The valve is operated by shaft 38 through the cam and shaft 38 is actuated manually by knob 72 and is also actuated by the clock works in housing 19. The clock works may be of any desired kind and are not shown. The knob is connected to the shaft 38 through a one-way clutch so manual actuation of the knob is effective to open the valve and wind the timer when the knob is rotated in one direction. Reverse rotation of the knob has no effect on the shaft position. The knob has a press fit on sleeve 70 journaled on flanged bushing 60 which is connected to the upper end of shaft 38 on the D or flattened portion thereof. The knob and sleeve also seat on the bushing flange. Sleeve 70 anchors one end of spring 66 coiled closely around the bushing so rotation of the knob in the valve opening direction acts to tighten or wind up the spring coils on the bushing to effect a driving connection. Reverse rotation of the knob relieves the coils (or unwinds the coils) sufficiently to prevent transmission of rotary motion to the bushing.

The knob is retained on the sleeve by snap ring 74 and the sleeve in turn is retained on the shaft by snap ring 78 with the exposed portions covered by cover 80 which snaps in place. A flanged disc 76 is connected to the underside of bushing 60 and since it is connected to the shaft, provides a convenient place for indicia cooperating with indicia on the cover 21 of the timer housing to indicate whether the timer is "on" or "off."

To place the valve in operation knob 72 is rotated clockwise to tighten spring 66 on bushing 60 and turn shaft 38 in a clockwise direction. As the knob (and indicia) approach the "on" position cock surface 42 engages surface 50 of abutment 48 and rotates cam 46 in a clockwise direction causing follower 30, and hence valve stem 26, to move to the right (as shown in the drawings) in the valve opening direction against the bias of spring 56. Note that the valve is not opened until knob 72 has been rotated substantially the entire distance between the "off" and "on" positions marked on the timer cover 21. After the valve has opened and the timer is fully wound the clock valve is tamper-proof and cannot be "short cycled." The timer mechanism then commences operation and drives member 40 in the direction indicated by the arrow in FIG. 2. Cam 46 remains unaffected in the valve-open position until drive member 40 rotates to the point where drive surface 44 engages surface 52 of abutment 48 whereupon the two move together a short distance until the drop point on cam 46 comes under the follower. At this instant cam 46 can accelerate clear of follower pin 30 as the pin drops under the bias of spring 56 and the valve is snapped shut.

After the timer has been set reverse rotation of the knob is not effective to shorten the cycle since the knob cannot drive the shaft in the reverse direction. Hence, the timer cycle cannot be cut short. The user could conceivably grasp the rim of disc 76 but this can be prevented by making the projection of the disc small (and hence difficult to grasp) or by placing the disc so close to the cover as to make the disc difficult to grasp.

Although but one embodiment of the present invention has been illustrated and described it will be apparent to those skilled in the art that various other changes and modifications may be made therein without departing from the spirit of the invention or from the scope of the appended claims.

I claim:

1. A clock controlled flow control comprising, a body having an inlet and an outlet, a valve controlling flow between the inlet and the outlet, timer means operatively connected to the valve and including valve control means operative to open the valve only when the timer means

has been set for substantially a full time cycle, and actuating means connected to the timer means through one-way clutch means whereby the timer means can be actuated by the actuating means only in the direction for setting the timer and opening the valve.

2. The flow control according to claim 1 in which the valve control means includes a drive member operatively connected to the timer means and a cam having a lost motion connection to the drive member.

3. The flow control according to claim 2 in which the drive member has a cock surface which engages means on the cam to drive the cam so that it opens the valve when the timer is substantially fully set, said drive member also having a drive surface which engages means on the cam to rotate the cam to close the valve when the timer reaches the end of the time cycle, the drive and cock surfaces being separated by a portion of the drive member which does not engage the cam regardless of the direction in which the drive member is rotated.

4. The valve according to claim 3 in which the means on the cam engaged by the cocking surface and drive surface is an abutment projecting into the plane of the drive member and having opposite sides for engagement with the drive and cock surfaces.

5. The valve according to claim 1 in which the timer means includes a shaft and the actuating means includes

a knob rotatably mounted on the shaft, a coil spring coiled around the shaft and connected to the knob so that rotation of the knob in the timer setting direction tightens the spring on the shaft to transmit the knob rotation to the shaft, the spring being ineffective to transmit rotation to the shaft when the knob rotation is reversed.

6. The flow control according to claim 5 in which means carrying indicia is fixed to the shaft.

7. The flow control according to claim 6 in which the timer means includes a timer casing, a cover for the casing, and indicia on the cover which cooperates with the indicia on the means fixed to the shaft.

8. A clock controlled flow control comprising, a body having an inlet and an outlet, a valve controlling flow between the inlet and the outlet, timer means operatively connected to the valve through lost motion means so the valve is opened only when the timer means has been substantially fully set, and actuating means connected to the timer means through one-way clutch means whereby the timer means can be actuated by the actuating means only in the direction for setting the timer and opening the valve.

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