April 18, 1933. F. C. LORENZ 1,903,788

GAS WATER HEATER CONTROL

Filed April 1, 1931

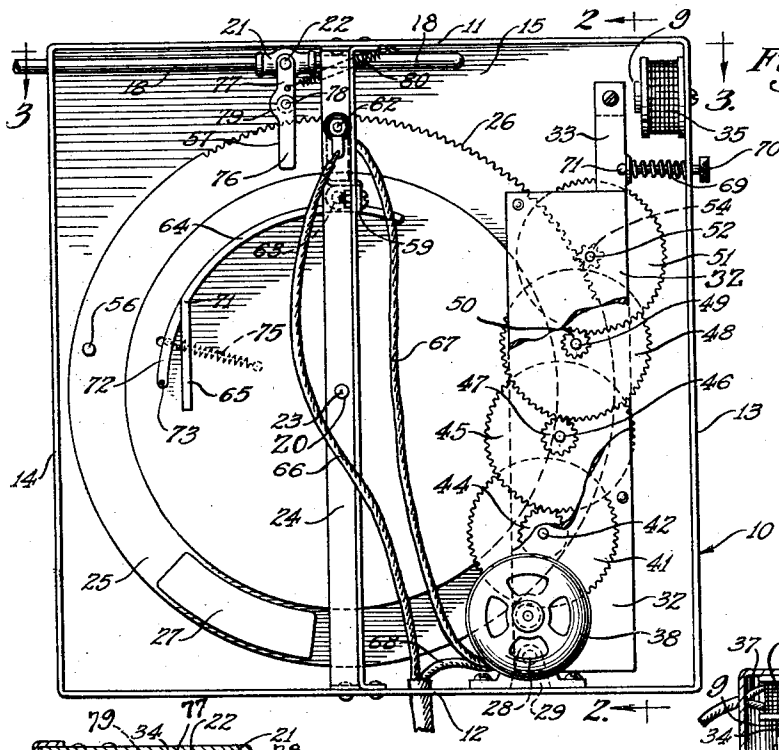


Fig. 1.

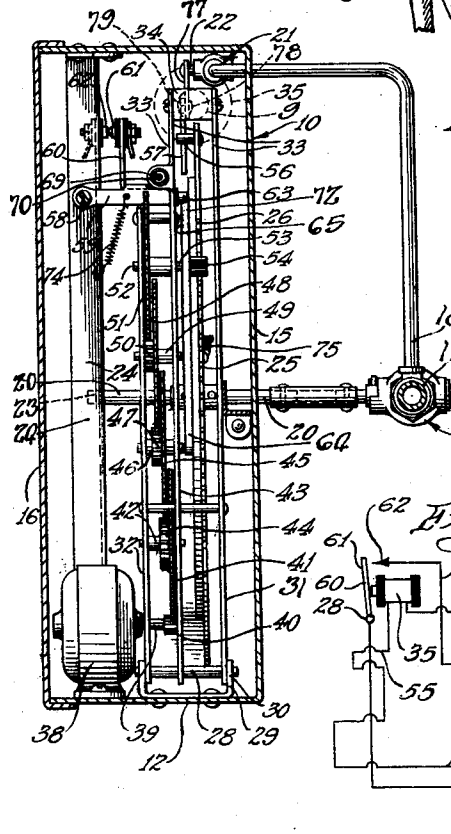


Fig. 2.

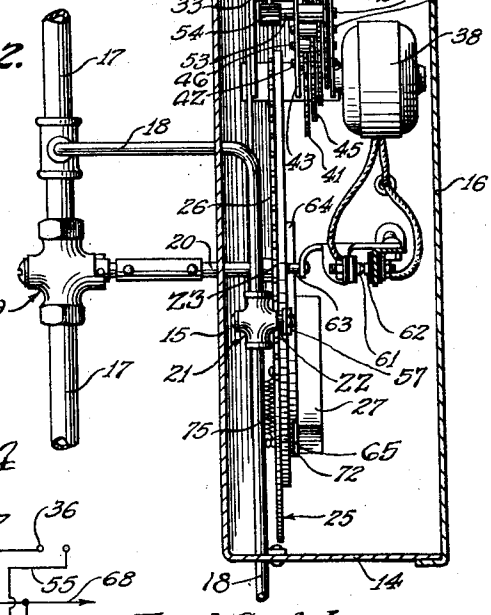


Fig. 3.

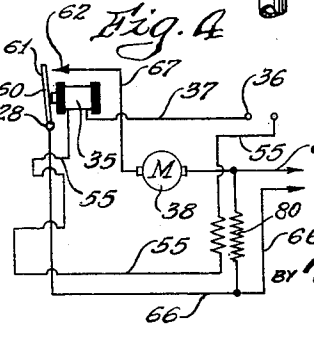


Fig. 4.

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Patented Apr. 18, 1933 1,903,788

# UNITED STATES PATENT OFFICE

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## GAS WATER HEATER CONTROL

Application filed April 1, 1931. Serial No. 527,005.

This invention relates to certain novel improvements in gas water heater controls, and has for its principal object the provision of an improved construction of this character which will be highly efficient in use and economical in manufacture.

It is an object of this invention to provide an improved device for automatically lighting and shutting off a gas burner for a water heater from a remote point.

It is another object of the invention to provide an automatic gas burner control which is so arranged that it will control the pilot light valve and feed line valve of a gas water heater from a remote point in a building in which the same is installed.

A further object of the invention is to provide a control device for a gas water heater burner which by the operation of closing a switch will turn the gas in the burner on and allow the burner to burn a sufficient length of time to heat the water in the heater to a predetermined temperature.

Other objects will appear hereinafter.

The invention consists in the novel combination and arrangement of parts to be hereinafter described and claimed.

The invention will be best understood by reference to the accompanying drawing showing the preferred form of construction, and in which:

Fig. 1 is a side elevational view of a preferred form of construction of the invention;

Fig. 2 is a sectional view on the line 2—2 in Fig. 1;

Fig. 3 is a top plan view on line 3—3 in Fig. 1; and

Fig. 4 is a schematic view of a wiring diagram employed in the invention.

In the drawing wherein a practical embodiment of the invention is illustrated, a housing of any approved construction is indicated at 10 and includes top wall 11, bottom wall 12, end walls 13 and 14 and side walls 15 and 16. A gas feed line to a water heater (not shown) is indicated at 17 and branched from this line 17 is a pipe 18 leading to a pilot light for the burner. In the feed line 17 is a suitable quarter turn valve structure 19 of any approved type and this valve has associated therewith a rotatable shaft 20, while in the pilot light feed line 18 is a valve 21 of any approved type which has associated therewith a shaft 22.

The end of the shaft 20 opposite valve 19 is journaled, as at 23, in a rib 24 that extends between the top and bottom walls 11 and 12 of housing 10. Mounted on the shaft 20 so as to be rotatable therewith is a wheel 25 which has gear teeth 26 formed on a certain arc of its periphery, and on this wheel 25, diametrically opposite the teeth 26, is a counterweight 27.

Having their lower ends pivotally mounted on a stub shaft 28 that extends between the upright arms 30 of a bracket 29 that is mounted on the bottom wall 12 of housing 10 are three spaced apart plates 31, 32 and 43, and the plates 31 and 43 have restricted or narrow upper ends 33 between which is mounted a block of magnetically attractable metal 34. On the upper end portion of wall 13 is a magnetic coil 35 which includes the core 9. Leading from coil 35 to a switch 36 which is adapted to be disposed at a suitable point in the building in which the device is installed is a conductor 37.

Mounted on the bottom wall 12 of housing 10 is a motor 38 of approved type which has a shaft 39 on which is a pinion gear 40 that meshes with a gear 41. The gear 41 is mounted on a shaft 42 that has one end journaled in the plate 32 and the other end journaled in plate 43 that is disposed between plate 32 and plate 31. Shaft 42 carries a pinion 44 that meshes with a gear 45 that is mounted on a stub shaft 46 which is similar to shaft 42, and shaft 42 carries a pinion 47 that meshes with a gear 48 that is mounted on a shaft 49 which is similar to shafts 42 and 46. Shaft 49 carries a pinion 50 which meshes with a gear 51 that is mounted on a shaft 52 which is journaled similarly in shafts 42, 46, and 49 but shaft 52 has an end portion 53 which is disposed between plates 43 and 31 and on this end portion 53 is a pinion 54 that meshes with the teeth 26 of wheel 25.

The pinion 54 is normally in mesh with the teeth 26 of wheel 25. However, by closing the switch 36 which may be disposed at a

suitable point in a building, such as in the kitchen or bath, circuit will be closed by way of conductor 55 to coil 35 which will cause block 34 to be attracted to core 9, which will cause plates 32, 43 and 31 to pivot on stub shaft 28 and pinion 54 will thus be released from engagement with gear teeth 26, thus allowing weight 27 to rotate wheel 25 counterclockwise (Fig. 1) into the position in which the parts are shown in Fig. 1.

When the pinion 54 is disengaged from teeth 26 of wheel 25 and counterweight 27 rotates wheel 25 in a counterclockwise direction, Fig. 1, pin 56 on wheel 25 engages an arm 57 that is carried by the rotatable shaft 22 which controls the pilot light valve 21. Valve 21 will, therefore, be opened to permit gas to flow through the feed line 18 to the pilot light.

Pivotally mounted, as at 58, on the rib 24 is an arm 59 which has an upward extension 60 carrying an insulated movable contact 61 which is associated, in a manner to be described presently, with a stationary contact 62 on rib 24. On the end of arm 59 which is opposite its pivotal mounting on rib 24 is a lug 63 which rides the cam surface 64 on wheel 25 when wheel 25 rotates counterclockwise in the hereinbefore described manner, and when wheel 25 commences this rotation lug 63 will be disposed on the cam surface 65 which is integral with cam surface 64. As the wheel 25 rotates counterclockwise, therefore, lug 63 will ride up onto cam surface 64 and since lug 63 is attached to arm 59, arm 59 will pivot at 58 and extension 60 of arm 59 will be raised to engage contact 61 with contact 62 and these two contacts will be held in engagement while lug 63 is riding over cam 64 so that circuit to motor 38 will be closed while contacts 61 and 62 are in engagement, through conductors 66 and 67 and 68, conductors 66 and 68 leading to a line source of current (Fig. 4). It will be understood, therefore, that switch 36 should be held closed by the operator until wheel 25 has moved far enough to open pilot light valve 21 by engagement of pin 56 with arm 57.

When pinion 54 is moved out of engagement with teeth 26 by attraction of block 34 by coil 35, the three plates 32, 43 and 31 are pivoted against the action of a spring 69 which is mounted on a pin 70 that is slidably mounted in wall 13 and in an ear 72 on portion 33 of plate 43. It will be seen, therefore, that after circuit to the motor 38 is closed by engagement of contacts 61 and 62 switch 36 will be released by the operator thereof and spring 69 will force the three pivotal plates 32, 43 and 31 to the left (Fig. 1), thus engaging pinion 54 with gear teeth 26 and motor 38 will then rotate wheel 25 through shaft 39, pinion 40, gear 41, pinion 44, gear 45, pinion 47, gear 48, pinion 50, gear 51, pinion 54 and gear teeth 26. Lug 63 will continue to ride over cam 64 and hold contact 61 in engagement with contact 62, thus keeping circuit closed to motor 38 (Fig. 4). When lug 63 reaches the juncture 71 between cam 64 and cam 65, lug 63 will ride over the cam 72 which is pivotally mounted on wheel 25, as at 73, it being understood that lug 63 really stands still while wheel 25 and the cams 64, 65 and 72 thereon rotate. As wheel 25 is rotated clockwise, Fig. 1, by the speed reducing gear train hereinbefore described, and the pivoted end of cam 72 comes under lug 63, lug 63 will fall off cam 72 and onto cam 65 (Fig. 1), thus allowing spring 74 to pull arm 59 and its extension 60 downwardly (Fig. 2) and thus disengage contact 61 from contact 62 and thereby open circuit to motor 38. Spring 74 has one end fastened to rib 24 and the other end fastened to arm 59.

The shaft 20 operates the quarter turn valve 19 so that the limit of counterclockwise rotation of wheel 25 is controlled by said valve 19 in any approved manner. It will be seen, therefore, that valve 19 will open feed line 17 to the gas water heater (not shown) on counterclockwise rotation of wheel 25 and shaft 20 (Fig. 1) and on the return or clockwise movement of wheel 25 and shaft 20 valve 19 will be completely closed at the time when lug 63 falls from cam 72 onto cam 65. Therefore, lug 63 will be disposed on cam 65 ready to travel thereover onto cam 64 when the wheel 25 commences its counterclockwise rotation at the start of the operation, and as the cam 65 travels under lug 63, lug 63 will engage cam 72 and pivot cam 72 at 73, against the action of spring 75 which has one end attached to cam 72 and the other attached to wheel 25. In this manner lug 63 rides up onto cam 64.

Pin 56 is shown in its position at the start of the operation in Fig. 2, ready to engage arm 57 and open valve 22 to the pilot light, while it is shown in Fig. 1 in the position it assumes when wheel 25 has finished its counterclockwise rotation and is ready to start on its clockwise movement as seen in Fig. 1, this disparity in the position of pin 56 in Figs. 1 and 2 being for the purpose of clarity in illustration.

The arm 57 includes two sections 76 and 77 which are interconnected by a hinge joint 78 and each of these arm portions includes a lip 79, which lips hold the arm 57 rigid as pin 56 engages arm portion 76 and rotates shaft 22 to open pilot light valve 21, while on the return or clockwise movement of wheel 25 arm portion 76 will engage pin 56 and said arm portion 76, being hinged at 78, will pass under pin 56 so as not to open the valve 21 on the return strike of the wheel 25. Having one end attached to arm portion 77 and the other end attached to wall 11 is a spring 80 which closes valve 21 when the pin 56 has

passed under arm portion 76 and opened said valve 21.

By means of the speed reducing gear train associated with motor 38 and shaft 39, the return or clockwise rotation of wheel 25 may be so controlled that a suitable interval of time will elapse between the moment when switch 36 is closed until the end of the clockwise rotation (Fig. 1) of wheel 25 so that the water heater burner will burn a sufficient length of time to warm the water in the heater (not shown).

A step-down transformer, such as indicated at 80, may be connected in series with the coil 35.

While I have illustrated and described the preferred form of construction for carrying my invention into effect, this is capable of variation and modification, without departing from the spirit of the invention. I, therefore, do not wish to be limited to the precise details of construction set forth, but desire to avail myself of such variations and modifications as come within the scope of the appended claims.

Having thus described my invention, what I claim as new and desire to protect by Letters Patent is:

1. In combination an automatically closing pilot light valve including a movable element, a feed line valve of a gas heater burner, a device for opening the pilot light valve, and the burner feed valve and shutting off the burner feed valve after a predetermined length of time, said device comprising a motor, a speed reducing gear train operable by said motor, a pivotal supporting structure for said gear train, a rotatable shaft controlling said burner feed valve, a counterweighted disc fast to said shaft, gear teeth on an arc of the periphery of said disc and said teeth meshing with one of the elements of said gear train when said valves are closed to prevent rotation of said disc, a cam on said disc, electro-magnetic means for attracting said supporting structure to throw said element of said gear train out of mesh with said teeth to permit rotation of said disc and shaft in one direction to open said burner feed valve, a member on said disc engaging said movable element at the beginning of said rotation of said disc to open said pilot light valve, means for meshing said element of said gear train and said disc teeth when said electro-magnetic means are in open circuit position, circuit closing means co-acting with said cam to close circuit to said motor after circuit to said electromagnetic means is opened, and said gear train meshed with said disc teeth, whereby to rotate said disc and cam in the opposite direction, to close said burner feed valve by rotation of said shaft.

2. In combination, an automatically closing pilot light valve including a movable element, a feed line valve of a gas heater burner, a rotatable shaft controlling said feed valve, a disc on said shaft gravity rotated in one direction, having gear teeth on an arc of its periphery, and a cam on said disc, a pivotally mounted gear train including a pinion, a motor for operating said gear train, electromagnetic means for disengaging said pinion from said disc teeth to permit rotation of said disc and shaft in one direction and thereby open said feed valve, a member on said disc engaging said movable element for opening said pilot light valve during said rotation, and circuit closing means co-acting with said cam during said rotation for closing circuit to said motor during said rotation and after said electromagnetic means are disposed in open circuit position and said pinion engaged with said disc teeth, whereby to rotate said disc and shaft in the opposite direction and close said feed valve.

3. In combination, an automatically closing pilot light valve including a movable element, a feed line valve of a gas heater burner, a rotatable shaft controlling said feed valve, a disc rotatable with said shaft and gravity rotated in one direction, said disc having gear teeth on an arc of its periphery, a cam on said disc, a pivotally mounted gear train, a motor for operating said gear train, electro-magnetic means for disengaging an element of said gear train from said disc teeth to permit rotation of said disc and shaft in one direction and thereby open said feed valve, a member on said disc engaging said movable element during said rotation for opening said pilot light valve, and circuit closing means including a pivotal contact bearing arm co-acting with said cam during said rotation for closing circuit to said motor during said rotation and after said electromagnetic means are disposed in open circuit position and said gear train element engaged with said disc teeth, whereby to rotate said disc and shaft in the opposite direction and close said feed valve.

In testimony whereof I affix my signature.

FRED CARL LORENZ.