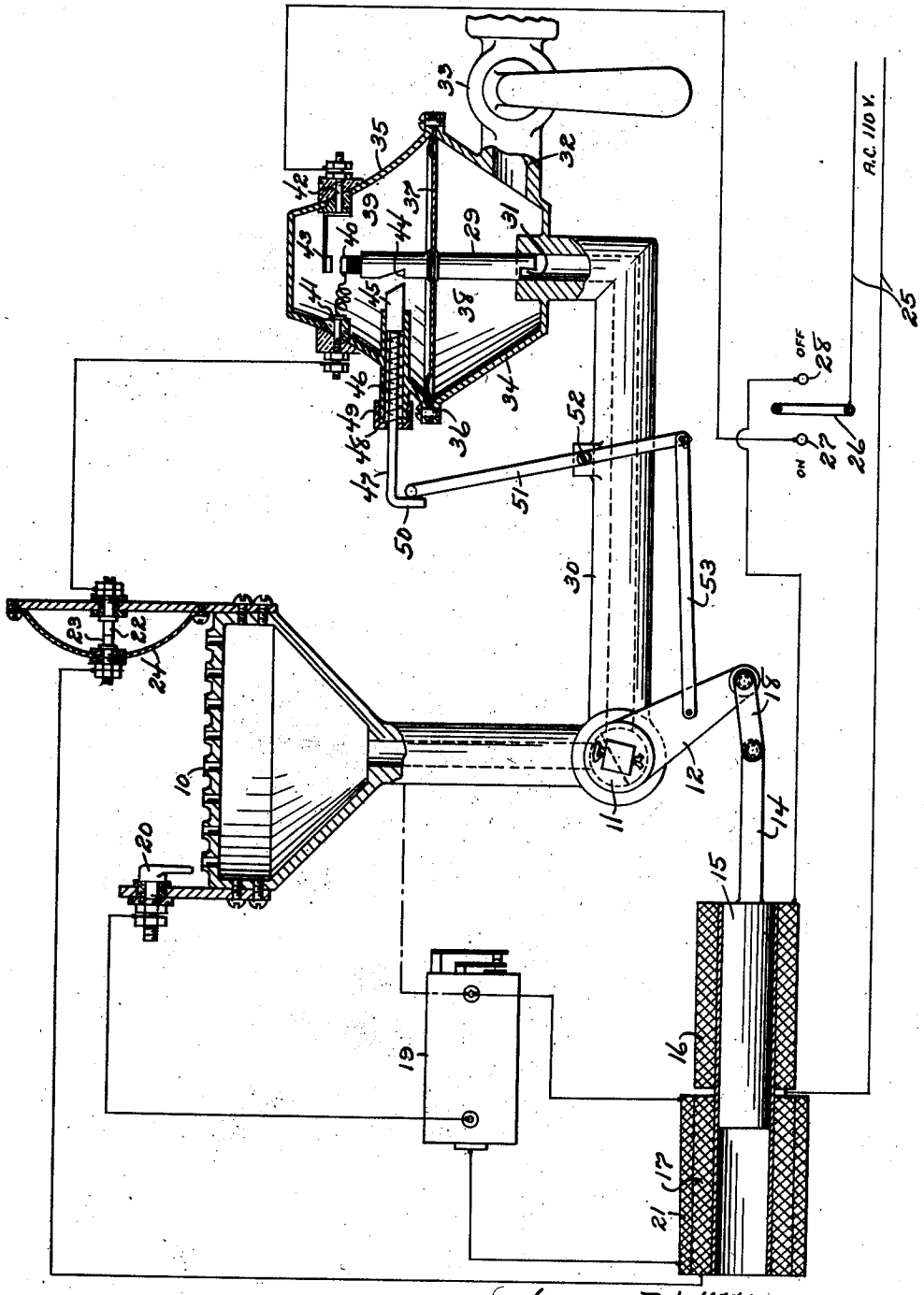
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REMOTE CONTROL AND SAFETY APPLIANCE FOR GAS BURNERS

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REMOTE CONTROL AND SAFETY APPLIANCE FOR GAS BURNERS

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9 Claims. (Cl. 175—115)

The object of the invention is to provide a remote control for gas burners, such as the so-called instantaneous water heater and equivalent devices, so that the user may readily ignite the burner at some remote point with assurance that the fuel valve will be turned on and the ignition apparatus simultaneously set into operation; to provide a device of the kind indicated which will automatically shut off the ignition device or apparatus after the burner has been ignited; to provide a safety device in appliances of this kind that will function to automatically shut off the gas supply in the event of a failure of the supply, thereby preventing the escape of the gas on the resumption of the supply; to provide a construction in which the ignition apparatus is so related to the safety appliance that the ignition apparatus will be prevented from operation when the safety appliance is in the shut-off position; and generally to provide apparatus of the kind indicated which is of simple form, susceptible of cheap manufacture, and of a character to permit its installation in connection with conventional apparatus without material modification of the latter.

With this object in view, the invention consists in a construction and combination of parts of which a preferred embodiment is illustrated in the accompanying drawing, wherein:

The figure is a view partly in section and partly in elevation of a gas burner with the invention applied in operative position thereon.

The burner 10 which may be the heating means of an instantaneous water heater, or of a radiant gas heater, or any equivalent device which it is desired to set in operation from a remote point, is provided with a control valve 11, the plug of which is provided with an arm 12 operatively connected with the stem 14 of a plunger 15 constituting the core of a solenoid composed of the coils 16 and 17. The plug of the valve 11 is turned angularly to move the valve to open or closed position, and since this necessitates angular movement of the arm 12, the operative connection between it and the stem 14 is in the form of a link 18 having terminal pivotal connections with the stem and with the arm. The coils 16 and 17 are designed to be alternately energized, the one moving the core 15 in one direction and the other moving the core in the other direction. When the coil 16 is energized, the consequent movement imparted to the core effects such turning movement of the plug of the valve 11 as to shift it to closed position. Energizing the coil 17 effects such movement of the core 15 as to turn the plug of the valve 11 to open position.

An ignition coil 19, of conventional form, is employed to ignite the gas issuing from the jets of the burner 10 when the plug of the valve is in open position. One terminal of the secondary of this coil is connected to an electrode 20, mounted upon but insulated from the burner structure but disposed in close proximity to the jets thereof. The other terminal of the secondary of the ignition coil is connected directly to the burner. Thus the current circulating in the secondary of the induction coil will jump from the electrode to the burner, the consequent spark igniting the issuing gas. The primary of the induction coil is designed to be energized only when the coil 17 in the control valve actuating means is energized, and this may be accomplished in any one of several conventional ways. In the present embodiment, a coil 21 is disposed in surrounding relation to the coil 17, and in combination with the latter constitutes a transformer of which the coil 17 is the primary and the coil 21 the secondary. This coil 21 has the primary of the ignition coil 17 connected directly across its terminals.

A thermostatic switch is incorporated in the apparatus and disposed adjacent the burner 10. This switch may be of any acceptable form, but in the present embodiment comprises the contacts 22 and 23 of which the former is mounted in but insulated from one wall of the burner structure, and the latter is carried at the center of a domed element 24 peripherally secured to the burner structure. The contact 23 is insulated from the domed element 24. Under normal temperatures, the contact 23 will be held in engagement with the contact 22, but when the domed element is subject to the heat of the burner, it will expand and move the contact 23 away from the contact 22.

One terminal of the coil 17 is connected with the thermostatic switch, as by a conductor run to the contact 23. The other terminal of the coil 17 is connected to one side of the supply line 25, the other side of which is connected to the movable element 26 of a manual switch which is of the single-pole, double-throw form, so that it may be engaged either with the contact 27 or the contact 28. That side of the supply line 25 connected with the coil 17 is similarly connected with one terminal of the coil 16, the other terminal of which is connected with the contact 28. The contact 27 is connected with the contact 22 of the thermostatic switch but in series with a cut-out switch which is controlled by and shifted to

open or closed positions by a shut-off valve designed to function as a safety appliance to prevent the resumption of the flow of gas in the event of a sudden failure in the source of supply. The shut-off valve is in the form of a plunger 29, the lower end of which enters the upturned end of a tubular conductor 30 communicating with the control valve 11. The shut-off valve, at the lower end, is formed with an axial slot 31 which, when the plunger is raised, provides a channel through which gas may reach the conductor 30 from the conductor 32, which leads to the source of supply, and in which there is provided a manual control valve 33.

The plunger valve 29 is housed in a casing interiorly with which the conductors 30 and 32 are in communication. This casing is composed of the complementary shells 34 and 35 secured together by means of bolts 36 passed through peripheral flanges with which the shells are formed. A diaphragm 37 divides the casing interiorly into two chambers, this diaphragm being interposed between the flanges of the two shells and securely held by said flanges. The one chamber, chamber 38, is a gas pressure chamber, and the other chamber, chamber 39, is a chamber in which the cut-out switch is housed. The plunger 29 passes axially through the diaphragm 37 and is fixedly secured to the latter, extending well up into the switch chamber and carrying at its upper end a contact 40 which is insulated from the plunger, but which is electrically connected with a binding post 41 mounted in, but insulated from, the wall of the shell 35, this binding post being electrically connected with the contact 22. A binding post 42 is mounted in the diametrically opposite side of the shell 35 and is connected with a contact 43 which is complementary to the contact 40, this binding post being connected with the contact 27 of the manual switch by which the apparatus is actuated. Gas entering the chamber 38 from the source of supply will, when the plunger 29 is low enough to shroud the slot 26 in the upturned end of the conductor 30, effect opening movement of the shut-off valve, since it will bulge the diaphragm 37 upwardly until the slot 31 is exposed, when gas may pass from the chamber 38 to the conductor 30. But with the plunger in position to permit the passage of gas, the contact 40 is brought into engagement with the contact 43, so that a circuit will be established on the coil 17 when the switch arm 26 is moved into engagement with the contact 27, if the thermostatic switch is in closed position, as it will be if the burner 10 is not lighted.

The plunger 29 is formed with a latch seat 44 which, when the shut-off valve is in the closed position, may be engaged by the latch 45, the latter being slidably mounted in the tubular guide 46 mounted in the wall of the shell 35 and having a stem 47 extending slidably through a cap 48 on the outer end of the guide. A compression spring 49 is disposed in the guide in surrounding relation to the stem and compressed by the inner end of the latch and the cap 48.

The stem 47 is formed with an angular extremity 50 arranged in the path of movement of the free end of a lever 51, this lever being a lever of the first order having a pivotal mounting 52 on a tubular conductor 30. The force arm of the lever 51 is connected by means of a link 53 with the arm 12 at an intermediate point in the length of the latter.

When the control valve 11 is in the closed position, which is the position indicated in the drawing, the link 53 will rock the lever 51 in a direction to cause the resistance arm of the latter to engage the angular terminal 50 of the latch, and thus retract the lever, so that it may, in the closed position of the control valve, engage the plunger 29 of the shut-off valve.

In the operation of the invention, the valve 33 is moved to open position and permitted to remain in this position. Gas from the source of supply can, therefore, reach the pressure chamber 38, and will thus bulge the diaphragm 37 upwardly moving the shut-off valve to open position by exposing its slot 31 above the upper edge of the upturned extremity of the conductor 30. At the same time, the contacts 40 and 43 will be brought into engagement. This will be the normal position of the shut-off valve except in the failure of the gas supply which will relieve pressure below the diaphragm and permit the plunger of the shut-off valve to drop to closed position. With the shut-off valve in its normally open position by reason of the gas pressure effective against its diaphragm, when it is desired to light the burner 10, the movable switch arm 26 is shifted to engagement with the contact 27, when current will flow from the line 25 to the binding post 42, thence over the contacts 43 and 40 to the contacts 22 and 23 of the thermostatic switch, thence through the coil 17, and thence back to the other side of the line. The coil 17 being energized, the plunger 15 will be sucked into it with the result that the plug of the valve 11 will be turned to open position, thus permitting gas to flow to the burner 10. But when the coil 17 is energized, so is the coil 21 which means that the primary of the ignition coil 19 is also energized, causing the current from its secondary to pass from the electrode 20 to the burner 10 in the form of sparks which will ignite the gas issuing from the jets of the burner. When the burner shall have been lighted, its heat will be effective on the dome 24 to expand the latter and thus open the thermostatic switch separating the contacts 23 and 22. The thermostatic switch being in series with the coil 17, the circuit on the latter will be open, and the ignition coil which derived its energy from the coil 17 will also be rendered inert. But with the movement of the valve 11 to open position, the lever 51 will have its resistance arm swung over toward the shut-off valve casing, so that the spring 49 will be free to impel the latch toward the plunger 29. But the latch cannot engage in the seat 44 because the plunger has been elevated and accordingly will only bear on the periphery of the plunger. As long as the gas supply remains intact, these positions of the parts will continue until the burner is extinguished by shutting off the gas supply by movement of the control valve 11 to closed position, which is accomplished by engaging the switch arm 26 with the contact 28. Such an operation will throw the coil 16 directly across the supply line 25, causing the plunger 15 to be sucked into the coil 16 with the resulting closing of the control valve by reason of the turning movement imparted to it through the movement of the plunger. The latch 45 will then be retracted by the resumption of the engagement of the lever 51 with the angular extremity 50 of the stem 47. Should the supply fail, however, during the operation of the burner 10, there would be no chance for escape of gas by the resumption of the supply, for the shutting off of the supply will relieve the diaphragm 37 of pressure, so that the shut-off valve will be moved to closed position by the dropping of the plunger 29. Since the latch

45 is free to function when the control valve 11 is open, it engages the seat 44 when the plunger 39 drops, and thus resumption of pressure in the supply line cannot shift the shut-off valve to open position until after the control valve 11 shall have been closed, so that the lever 51 may function to retract the latch. The burner may then be reignited if desired by re-engaging the switch arm 26 with the contact 27.

What is claimed is:

1. An appliance of the kind indicated comprising in combination with a gas burner, a shut-off valve interposed between the burner and the source of gas supply and normally impelled to closed position but gas pressure actuated to open position, ignition apparatus having an electrode disposed in close proximity to the jets of the burner, a latch retaining the valve in closed position, an electromagnet operatively connected with the latch to effect release of the same, and an ignition circuit including the electrode, the burner and the electromagnet to provide interdependence between the energization of the electrode and the release of said latch.

2. An appliance of the kind indicated comprising in combination with a gas burner, a shut-off valve interposed between the burner and the source of gas supply and normally impelled to closed position but gas pressure actuated to open position, ignition apparatus having an electrode disposed in close proximity to the jets of the burner, a latch retaining the valve in closed position, an electromagnet operatively connected with the latch to effect release of the same, and an ignition circuit including the electrode, the burner and the electromagnet to provide interdependence between the energization of the electrode and the release of said latch, said ignition circuit including a circuit closer operatively connected with the valve structure to remain open except when the valve is in open position.

3. An appliance of the kind indicated comprising in combination with a gas burner, a shut-off valve interposed between the burner and the source of gas supply and normally impelled to closed position but gas pressure actuated to open position, ignition apparatus having an electrode disposed in close proximity to the jets of the burner, a latch retaining the valve in closed position, an electromagnet operatively connected with the latch to effect release of the same, and an ignition circuit including the electrode, the burner and the electromagnet to provide interdependence between the energization of the electrode and the release of said latch, said ignition circuit including a thermostatic circuit closer positioned adjacent the burner for movement to open position when the burner is lighted, and a second circuit closer in series with the thermostatic circuit closer and operatively connected with said shut-off valve for closure only when said shut-off valve is in open position.

4. An appliance of the kind indicated comprising in combination with a gas burner, a supply conductor for the same, a valve included in said conductor to open and close passage through the same, a casing in which said valve is disposed, a diaphragm carried within said casing and connected with the valve and defining in conjunction with the casing a gas pressure chamber through which gas passes to said conductor, a latch to retain said valve in closed position on decline of gas pressure against said diaphragm, a remotely controlled release for said latch, an ignition circuit for igniting the burner, and a circuit closer controlling said ignition circuit and operatively connected with said valve to be closed by the valve only when the latter is in open position.

5. An appliance of the kind indicated comprising in combination with a gas burner, a supply conductor for the same, a valve included in said conductor to open and close passage through the same, a casing in which said valve is disposed, a diaphragm carried within said casing and connected with the valve and defining in conjunction with the casing a gas pressure chamber through which gas passes to said conductor, a latch to retain said valve in closed position on decline of gas pressure against said diaphragm, a remotely controlled release for said latch, an ignition circuit for igniting the burner, a circuit closer controlling said ignition circuit and operatively connected with said valve to be closed by the valve only when the latter is in open position, and a thermostatic circuit closer in series with the aforesaid circuit closer, said thermostatic circuit closer being normally closed but positioned adjacent the burner for movement to open position by the heat generated after the burner is lighted.

6. An appliance of the kind indicated comprising in combination with a gas burner, a control valve for the same, ignition apparatus having an electrode disposed in close proximity to the jets of the burner, an electromagnetic means for actuating the control valve, an ignition circuit including the electrode and the burner and operatively connected with the valve actuating means to be energized only when said means is energized, a shut-off valve interposed between the control valve and the source of gas supply and normally impelled to closed position but gas pressure actuated to open position, and a circuit closer in series with the valve actuating means and operatively connected with the shut-off valve to be moved to closed position only when the shut-off valve is open.

7. An appliance of the kind indicated comprising in combination with a gas burner, a control valve for the same, ignition apparatus having an electrode disposed in close proximity to the jets of the burner, an electromagnetic means for actuating the control valve, an ignition circuit including the electrode and the burner and operatively connected with the valve actuating means to be energized only when said means is energized, a shut-off valve interposed between the control valve and the source of gas supply and normally impelled to closed position but gas pressure actuated to open position, and operative connections between the last said valve and the control valve actuating means to render the latter inert to move the control valve to open position except when the shut-off valve is in open position.

8. An appliance of the kind indicated comprising in combination with a gas burner, a control valve for the same, ignition apparatus having an electrode disposed in close proximity to the jets of the burner, an electromagnetic means for actuating the control valve, an ignition circuit including the electrode and the burner and operatively connected with the valve actuating means to be energized only when said means is energized, a shut-off valve interposed between the control valve and the source of gas supply, and a cut-out switch in series with the valve actuating means and in open position except when the shut-off valve is in open position.

9. An appliance of the kind indicated comprising in combination with a gas burner, a control valve for the same, ignition apparatus having an electrode disposed in close proximity to the jets of the burner, an electromagnetic means for actuating the control valve, an ignition circuit including the electrode and the burner and operatively connected with the valve actuating means to be energized only when said means is energized, a thermostatic switch disposed adjacent the burner to be moved to open position by the heat from the latter, a shut-off valve interposed between the control valve and the source of supply, and a cut-out switch operatively connected with said shut-off valve, said cut-out switch and thermostatic switch being connected in series with the valve actuating means, said cut-out switch being in closed position except when the shut-off valve is in closed position.

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