Dec. 30, 1952 W. E. TRAYNOR 2,623,545

MANUAL CONTROL FOR AUTOMATIC FUEL VALVES

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FIG. 1.

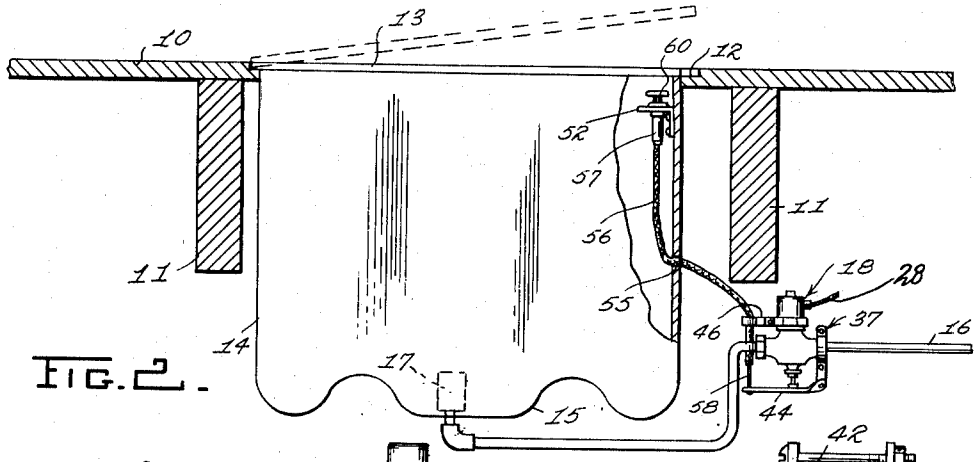

FIG. 2.

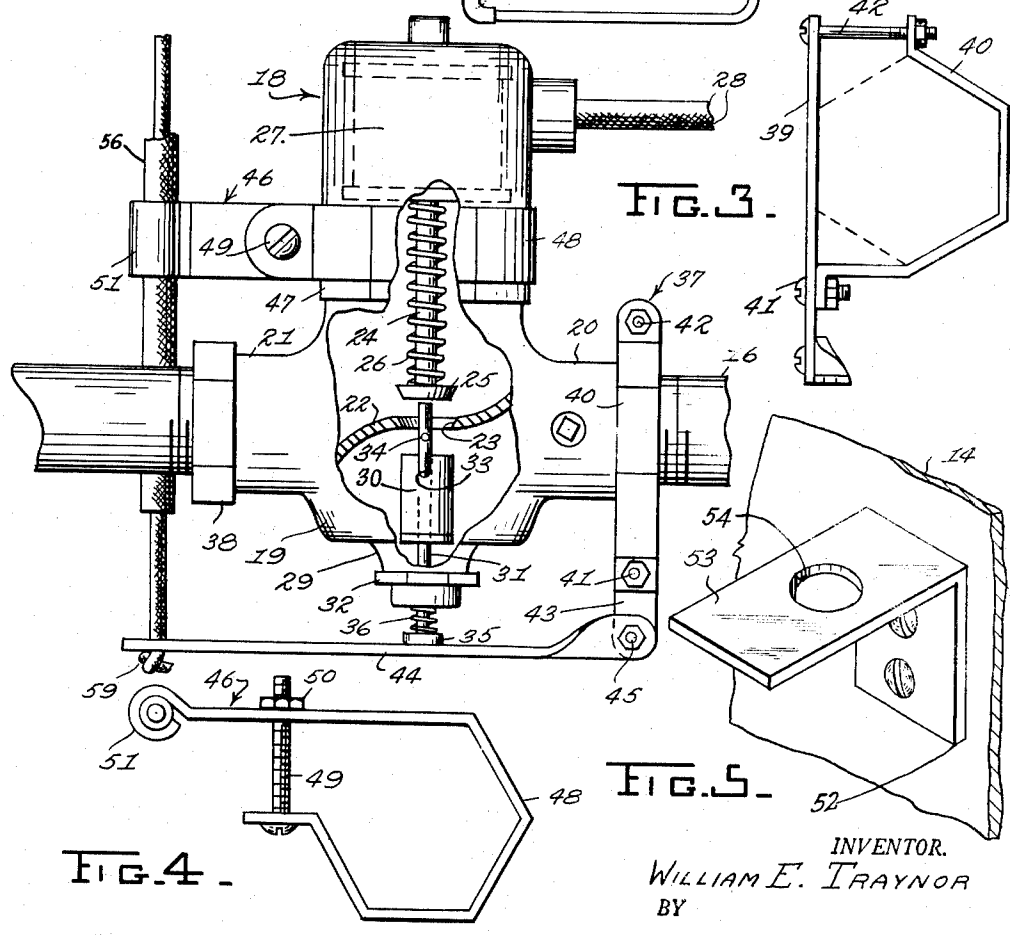

FIG. 3.

FIG. 4.

FIG. 5.

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MANUAL CONTROL FOR AUTOMATIC FUEL VALVES

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2 Claims. (Cl. 137—720)

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This invention relates to manual controls for automatic valves, and more particularly to a manual control for a solenoid-operated fuel valve for a floor-mounted stove or furnace.

Many dwelling houses are built without basements and in those areas where natural gas is available, such houses are frequently heated by small furnaces or stoves mounted on the floor joists immediately below the first floor of such a house. Such a furnace is supplied with gaseous fuel through a suitable gas pipe and gas-regulating valve is interposed in this pipe. The regulating valve is usually a solenoid-operated valve controlled by a thermostatic switch to maintain the temperature in the house near some selected value.

Many such houses are located in rural areas where the electric power supply is not entirely reliable and when the power fails, the fuel-control valve will close, cutting off the supply of fuel to the furnace. If heat is required under these circumstances, it is necessary to crawl under the house and hand-set the valve to open condition, and when the electric power service is restored, it is again necessary to crawl under the house and release the fuel-control valve for automatic operation.

The top of such a stove or furnace is covered by a grill providing a hot air outlet and a cold air return for the furnace, but the fuel-control valve is so located outside of the furnace that it cannot be reached from the grill opening in the floor.

It is among the objects of the present invention to provide a manual control for the automatic fuel-control valve of a floor furnace, which manual control is easily accessible from above the floor carrying the furnace, and through the grill opening in the floor, and is effective to secure the fuel-control valve in open position and to release the valve for automatic operation, can be easily applied to an existing furnace and fuel-control valve without material modification of the furnace and valve structure, is simple and durable in construction, not subject to malfunctioning in use, and is extremely economical to manufacture and install.

Other objects and advantages will become apparent from a consideration of the following description and the appended claims in conjunction with the accompanying drawing, wherein:

Figure 1 is a cross-section of a fragmentary portion of a house floor showing a floor furnace and automatic fuel-control valve for the furnace

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located below the floor, and a manual valve control illustrative of the invention operatively applied to the valve and the furnace;

Figure 2 is a side elevation on an enlarged scale of the fuel-control valve and the manual control means for the valve, a portion of the valve being broken away and shown in cross-section to better illustrate the construction thereof;

Figure 3 is an edge elevation of a split clamp constituting an operative component of the manual control mechanism;

Figure 4 is an edge view of a valve-carried bracket also constituting an operative component of the manual control mechanism; and

Figure 5 is a perspective view of a fragmentary portion of the furnace wall and an angle bracket also constituting an operative component of the manual control mechanism.

With continued reference to the drawing, the floor 10 is of conventional construction and is supported on spaced-apart, substantially parallel joists 11 in the usual manner. Between two of the joists 11 the floor is provided with an opening 12 and a movable grill 13 fits in this opening. A flange furnace or floor furnace 14, conventionally comprising a hollow, cylindrical body having an open top and a bottom wall 15 closing its bottom end, is secured to the joists 11 or to the floor in position such that its top end is received in the floor opening 12 and covered by the grill 13. The arrangement of the grill and furnace is such as to provide a centrally-located, warm-air outlet and a cold-air return substantially surrounding the warm-air outlet. A gas pipe 16 leads to the gas burner 17 disposed within the furnace 14 substantially at the center of the furnace bottom wall 15 to supply gaseous fuel to the furnace and a fuel-control valve, generally indicated at 18, is interposed in the pipe 16 outside of the furnace.

The automatic fuel valve is particularly illustrated in Figure 2, and comprises a hollow valve body 19 having at one end an inlet pipe fitting 20, at the other end an outlet pipe fitting 21, and an apertured, internal partition 22 extending between the inlet and outlet fittings and internally separating the inlet fitting from the outlet fitting, flow of gas through the valve being limited to passage through the partition opening 23. A valve plunger 24 is slidably mounted in the valve body concentric with the partition opening 23 and carries at its lower end a valve head 25 which is effective to close the opening 23 when lowered by the plunger. A coiled com-

pression spring 26 surrounds the valve stem and resiliently urges the head to valve-closing position, and an electric solenoid 27 mounted on the top of the valve body 19 has an armature connected with the upper end of the valve stem 24 and is effective to move the valve stem to valve-opening position against the force of spring 26 when the solenoid is energized. The solenoid is connected through suitable conductors 28 with a source of electric energy and with a thermostatic switch, not illustrated, the arrangement being such that when the thermostatic switch is closed, indicating a requirement for additional heat, the solenoid is energized to open the fuel valve, and when the thermostatic switch is open, indicating a condition of sufficient heat, the valve is closed by the spring 24.

An apertured boss 29 is provided on the bottom of the valve body with its aperture in alignment with the valve stem 24, and a cylinder 30 is mounted in the valve body at the inner side of boss 29 and provided with a bore in alignment with the aperture in the boss. A plunger 31 extends through the boss 29 and the cylinder 30 and bears at its inner end against the under side of the valve head 25, and suitable packing in the boss is compressed around this plunger by the gland nut 32. The cylinder 30 is provided in its inner end with a pair of diametrically-opposed notches 33, and a pin 34 extends transversely through the plunger 31 at the inner end of the cylinder 30. The position of the transverse pin 34 is such that when it is received in the notches 33 the valve head 25 can seat in the opening 23 in the partition 22, and when the pin rests upon the inner end of the cylinder 30 the valve head is held away from the partition 22 in valve-opening position, as illustrated in Figure 2. A push button 35 is secured on the outer end of plunger 31, and a coiled compression spring 36 surrounds the plunger between the push button 35 and the boss 29 to resiliently urge the plunger outwardly of the valve body.

With this arrangement, when it is desired to hand-set the valve to open position the push button 35 is pushed inwardly until the pin 34 is moved out of the notches 33 and the push button is then rotated through substantially one-quarter of a revolution to bring the pin in juxtaposition to the inner end of the cylinder 30 away from the notches 33. When the push button 35 is then released, the plunger will hold the valve open. When it is desired to restore the valve to automatic operation the push button is rotated until the pin 34 is returned to the notches 33 and the spring 36 will then hold the pin in these notches and the plunger away from the valve head 25, so that the valve head is free to move under the control of the solenoid 27.

The above-described furnace and valve construction is more-or-less conventional, and constitutes no part of the present invention, except in the combination thereof with the novel manual control means now to be described.

A split clamp, generally indicated at 37, is secured to the valve body surrounding the inlet pipe fitting 20. The inlet pipe fitting is provided with a hexagonal union nut similar to the nut 38 at the outer end of the outlet fitting 21, and the clamp 37 comprises a straight bar 39 having an intermediate portion lying against one face of the nut and extending beyond the nut in both directions. This bar is provided with a respective aperture adjacent each end, and with a third aperture spaced inwardly from one of the end apertures. A U-shaped clip 40, shaped to fit the faces of the hexagonal nut has respective outwardly-turned apertured portions at its opposite ends. A bolt 41 extends through the intermediate aperture in the bar 39 and through the aperture near one end of the clip 40 to secure such one end of the clip to the bar, and an elongated bolt 42 extends through the aperture at one end of the bar 39 and through the aperture at the opposite end of the clip 40 to bring the corresponding ends of the bar and clip together, and compress the nut between the bar and the clip to thereby firmly secure the split clamp on the nut. The end portion of the bar 39 depending below the inlet pipe fitting of the valve body constitutes an apertured ear 43, and a lever 44 is pivotally connected at one end to the ear 43 by a pivot bolt 45, the lever being twisted through substantially 90-degrees near its pivotally-mounted end so that the pivoted end portion is parallel to the ear 43, while the remainder of the lever is disposed substantially at right angles to the longitudinal extent of this ear. This lever passes by the outer end of the push button 35 and is provided with an aperture near its free end.

A bracket, generally indicated at 46, surrounds and is secured to the hexagonal union nut 47 by means of which the solenoid 27 is secured to the upper side of the valve body. This bracket 46 is particularly illustrated in Figure 4, and may comprise a single-piece band bent to form a substantially hexagonal loop 48 of a size to surround and closely fit the nut 47. The band is turned outwardly at the end of the loop and apertured to receive the clamp bolt 49 which extends through an aperture provided in the intermediate portion of the strip and is threaded through a nut 50 to clamp the loop firmly about the nut 47. The opposite end of the strip is bent to form a cylindrical eye 51.

An angle bracket 52 is secured to the inner side of the furnace wall near the upper end of the furnace and immediately below the grill 13 in position such that one leg 53 of the bracket projects inwardly of the furnace wall. This leg 53 is provided with an aperture 54, and an aperture 55 is provided in the furnace wall below the bracket 52.

A flexible tube 56 is secured at its upper end to the bracket 52 by a fitting 57 which extends through the aperture 54 in the bracket leg 53 and is clamped to this bracket leg, and this tube is clamped near its lower end in the eye 51 of the bracket 46. A flexible strand 58 extends through the tube 56 and is slidable therein. This strand passes at its lower end through the aperture in the free end of lever 44, and is secured to the free end of the lever by suitable means, such as the knot 59 or by being soldered or brazed to the lever. A pull knob 60 is secured to the upper end of the flexible strand 58 and may have a stem which is slidable in the fitting 57 and may be frictionally engaged with the fitting at various positions relative thereto by rotating the knob. The frictional engagement between the stem and fitting is had by means of a well-known type of fitting 57 wherein a tapered, slotted nut threaded into a tapered socket has a squared opening receiving a squared stem of the knob 60. As flexible cable locks of this character are well known to the art, a detailed description thereof is considered unnecessary for the purposes of the present disclosure.

With the above-described arrangement, when it is desired to open the fuel-control valve 18 and maintain this valve open independently of the operation of the solenoid 27, the grill 13 is raised

and the knob 60 is pulled upwardly, thereby bringing the lever 44 into contact with the push button 35 and forcing the plunger 31 inwardly of the valve housing to move the valve head 25 away from the partition 23. The valve may be maintained in this open position by the friction between the flexible strand 58 and the flexible tube 56, or the strand may be locked against movement by rotating the pull knob 60, as indicated above. When it is desired to return the fuel-control valve to automatic operation, the pull knob is first rotated, if necessary, to release the strand, and is then pushed down to move the lever 44 in a direction away from the push button 35. When the lever 44 is used to open the valve, the push button is not rotated, and the pin 34 thus does not, at any time, engage the inner end of the cylinder 30, but is, at all times, in alignment with the notches 33.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiment is, therefore, to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are, therefore, intended to be embraced therein.

What is claimed is:

1. In combination with an automatic fuel valve including a hollow valve body having oppositely disposed inlet and outlet fittings thereon and a partition disposed between said fittings and provided with an opening, a plunger disposed in said body in alignment with the opening in said partition, a valve head on one end of said plunger seating in said opening to close the valve, spring means resiliently urging said plunger and valve head to valve closing position, electric solenoid means mounted on said body and connected to said plunger to move said plunger and valve head to valve opening position against the force of said spring means, a guide secured in said body at the side of said partition remote from said plunger and having a bore therethrough in alignment with said plunger, said body having an aperture in registry with said bore, and a stem extending through said bore and the aperture in said body and bearing at its inner end against said valve head to move the latter to valve opening position against the force of said spring means in response to inwardly directed pressure on the outer end of said stem, means for maintaining the valve open comprising a first bracket mounted on one of said fittings and having an arm terminating near the outer end of said stem, a lever pivotally connected at one end to said arm at the distal end of the latter and in engagement intermediate its length with the outer end of said stem, a second bracket secured to said valve body and having an outwardly projecting arm terminating adjacent the other end of said lever, a flexible tube secured near one end to the distal end of the arm of said second bracket, a flexible strand extending through said tube and secured at one end to said other end of

the lever, said strand being slidable in said tube against frictional resistance, and a pull knob secured to said strand at the other end of the latter for moving said lever to exert valve opening pressure on the outer end of said stem.

2. In combination with an automatic fuel valve including a hollow valve body having oppositely disposed inlet and outlet fittings thereon and a partition disposed between said fittings and provided with an opening, a plunger disposed in said body in alignment with the opening in said partition, a valve head on one end of said plunger seating in said opening to close the valve, spring means resiliently urging said plunger and valve head to valve closing position, electric solenoid means mounted on said body and connected to said plunger to move said plunger and valve head to valve opening position against the force of said spring means, a guide secured in said body at the side of said partition remote from said plunger and having a bore therethrough in alignment with said plunger, said body having an aperture in registry with said bore, and a stem extending through said bore and the aperture in said body and bearing at its inner end against said valve head to move the latter to valve opening position against the force of said spring means in response to inwardly directed pressure on the outer end of said stem, means for maintaining the valve open comprising a first bracket mounted on one of said fittings and having an arm terminating near the outer end of said stem, a lever pivotally connected at one end to said arm at the distal end of the latter and in engagement intermediate its length with the outer end of said stem, a second bracket secured to said valve body and having an outwardly projecting arm terminating adjacent the other end of said lever, a flexible tube secured near one end to the distal end of the arm of said second bracket, a flexible strand extending through said tube and secured at one end to said other end of the lever, said strand being slidable in said tube against frictional resistance, a pull knob secured to the other end of said strand, and means secured to said flexible tube at the other end thereof and by said strand adjacent said pull knob for locking said strand against movement relative to said tube to hold said strand under tension and said valve open.

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