

March 9, 1943.

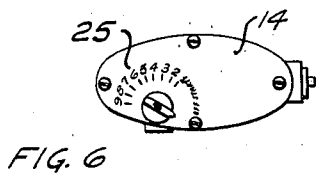
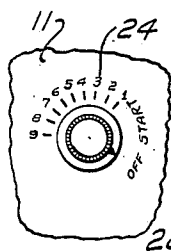
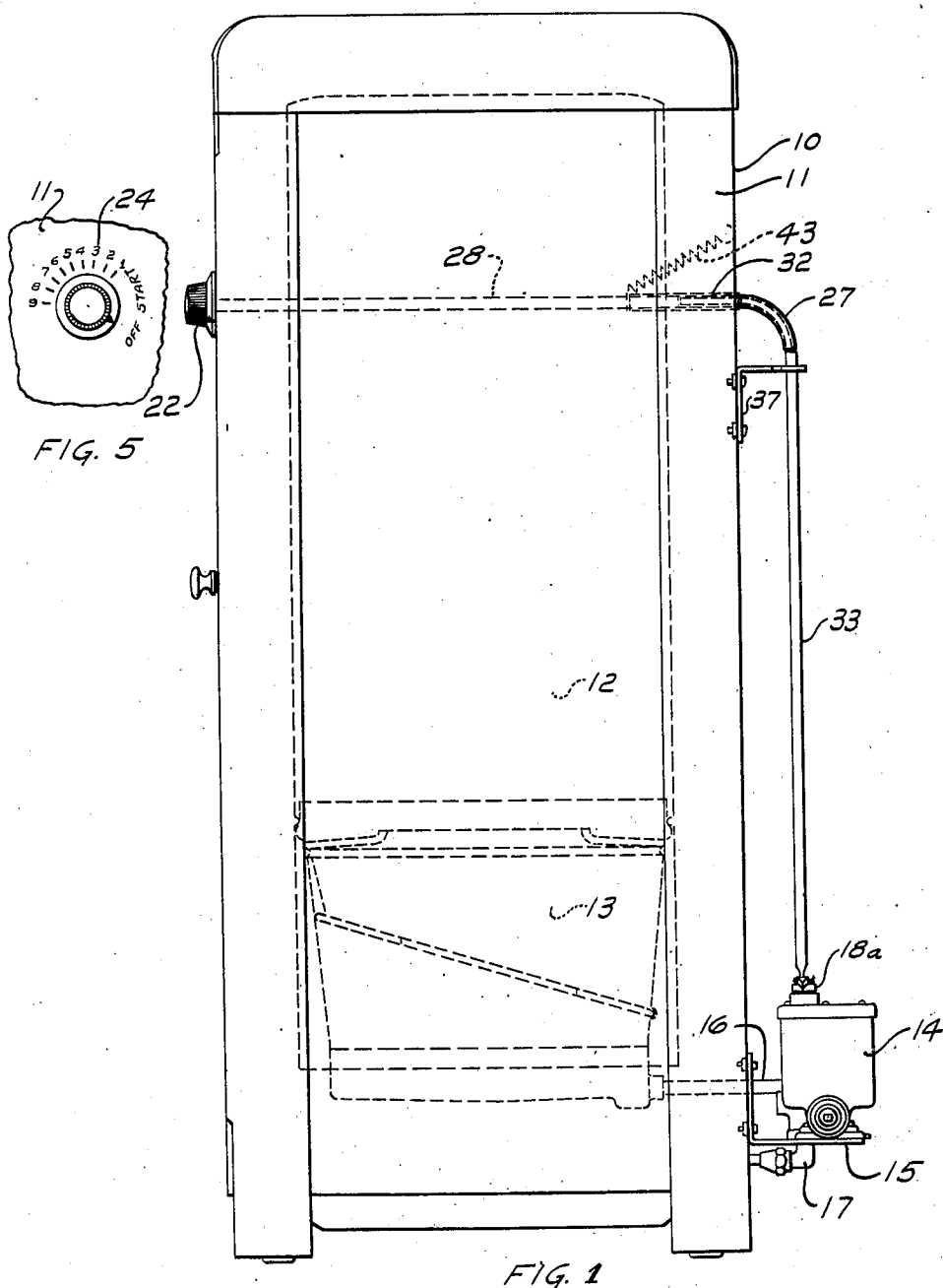
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FUEL CONTROL FOR OIL BURNERS

Filed Jan. 18, 1940

2 Sheets-Sheet 1



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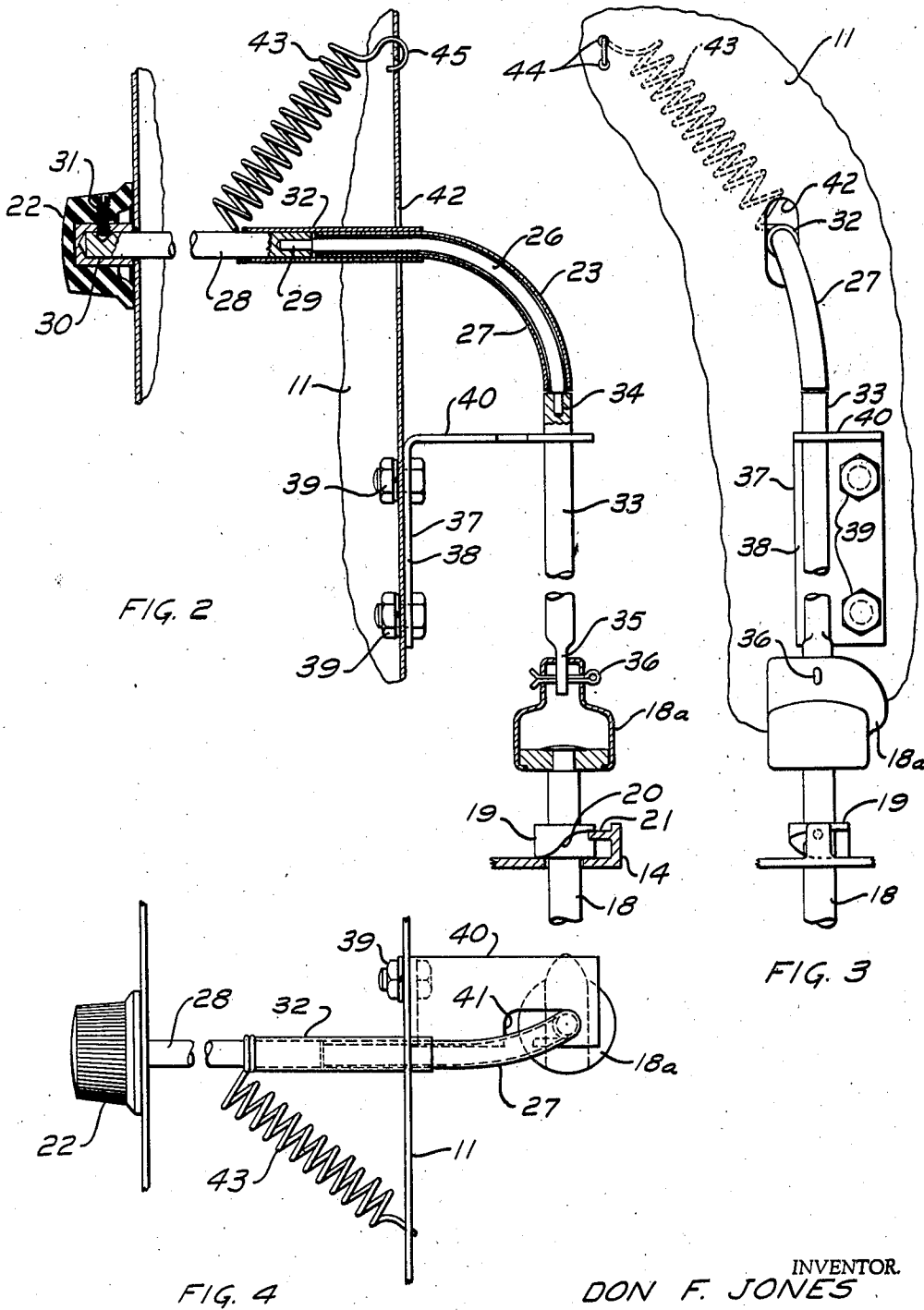
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FUEL CONTROL FOR OIL BURNERS

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FUEL CONTROL FOR OIL BURNERS

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3 Claims. (Cl. 74—504)

This invention relates to fuel controls for oil burning heaters and more particularly to the mechanism for operating such controls.

It is customary to locate the fuel control which includes the metering valve for an oil burning heater at the rear and adjacent the bottom thereof in order to position it near the burner and also to make it as inconspicuous as possible. That location has the disadvantage that it renders the control rather inaccessible when it becomes necessary to regulate the flow of fuel to the burner. In order to overcome this difficulty, various attempts have been made to operate the control from above or at the front of the heater by means of an extension shaft or other remote control device connected to the stem of the metering valve. Such efforts have not been entirely successful because of the excessive lost motion or back lash in the extension shaft which prevents the position of the handle or dial from accurately indicating the position of the metering valve. Furthermore, the cost of previous devices of this type has been relatively great. A still further objection to previous constructions on this order has been that they are prone to develop rattles and squeaks in service.

Accordingly, the principal object of this invention is to provide a remote control device which has little or no lost motion between the operating handle or knob and the metering valve stem. Another object is to provide such a device which is simple, inexpensive and easily fabricated and assembled. Another object of the invention is the provision of a remote control mechanism for a fuel control which is resiliently supported in order to prevent rattles and squeaks from developing.

These objects will more fully appear in the following specification, reference being made to the accompanying drawings, wherein—

Figure 1 is a side elevational view of an oil burning heater of the circulating type embodying this invention;

Figure 2 is a fragmentary cross-sectional view of the heater showing the remote control device in more detail;

Figure 3 is a fragmentary side elevational view of the structure shown in Figure 2;

Figure 4 is a fragmentary top plan view of the structure shown in Figures 2 and 3;

Figure 5 is a fragmentary front elevational view of the heater showing the operating knob or handle and the indicating dial surrounding the same; and

Figure 6 is a top plan view of the oil control itself.

Briefly, the invention comprises an extension device for the stem of the metering valve in the fuel control. The extension device includes a rotatable control knob having its axis of rotation at an angle (in this case 90 degrees) to the axis of the valve stem. The control knob is connected to the valve stem by a pair of straight rigid rods and a flexible shaft. One rod is aligned with the axis of the knob. The other rod is aligned with the axis of the stem. The flexible shaft is interposed between the two rods and has its opposite ends axially aligned with the adjacent rod. Novel means are provided for maintaining the parts in aligned position and for preventing lost motion between the parts.

Referring now more specifically to the drawings, Figure 1 illustrates a heater 10 of the so-called circulating type having an outer casing 11. Supported within the casing 11 is an inner shell 12, shown in dotted lines, which forms the combustion chamber for the burner and air jacket surrounding an oil burner 13.

A fuel control 14 is secured by means of a bracket 15 to the back wall of the casing 11. The control 14 is connected by conduit 16 to the oil burner 13 and by another conduit 17 to a suitable supply tank, not shown. The control 14 is conventional and includes a rotatable and vertically movable valve having a valve stem 18 which projects through the top of the control. Rigidly attached to the valve stem 18 is a cam ring 19 having a cam surface 20 which rides on a lug 21 on the top of the housing of the control 14. A handle 18a is rigidly secured to the upper end of the valve stem 18. The handle 18a is normally provided for operating the control when no extension shaft is employed. Rotation of the valve stem 18 causes the cam 19 to raise or lower the stem 18 relative to its seat to admit more or less fuel to the burner.

A knob 22 for rotating the valve stem 18 is mounted at the front of the casing 11 and is connected by means of an extension shaft assembly 23 to the valve stem 18. Suitably inscribed on the front casing of the panel is a dial 24 which corresponds with a dial 25 on the fuel control 14 to indicate the different settings of the valve in the fuel control 14.

The extension shaft assembly 23 comprises a flexible shaft 26, the opposite ends of which are axially aligned with the valve stem 18 and the knob 22. Surrounding the shaft 26 is a tubular shroud 27. This shroud is substantially

rigid and is nearly but not quite as long as the flexible shaft 26. The internal diameter of the shroud 27 is slightly greater than the diameter of the shaft 26, the difference in diameter being just enough to permit the shaft 26 to turn freely within the shroud 27. Preferably this shroud 27 is bent to shape before connection to the other parts of the assembly 23.

A rigid rod 28 is axially aligned with and attached securely at one end to the flexible shaft 26 and at its other end to the knob 22. Preferably the shaft 26 is provided with a non-circular extension 29 which fits within a recess in the adjacent end of the rod 28. The other end of the rod 28 seats in a socket 30 in the knob 22 and is held in place therein by means of a set screw 31. The diameter of the rod 28 is substantially the same as the diameter of the shroud 27.

A sleeve 32 is slipped over the joint between the rod 28 and the adjacent end of the shroud 27 and fits relatively snugly thereover. It will be noted from the drawing that the sleeve 32 overlaps a substantial portion of both rod 28 and shroud 27 and thereby maintains the adjacent ends of the latter in alignment at all times.

The other end of the shaft 26 and the upper end of the handle 18a are connected together by a second rigid rod 33 axially aligned therewith. The upper end of the rod 33 has a socket which receives a non-circular extension 34 on the adjacent end of the shaft 26. The parts 26 and 33 are assembled so that there is a slight space left between the adjacent ends of the shroud 27 and the rod 33. The lower end of the rod 33 is flattened at 35 and projects through an opening in the top of the handle 18a. The rod is held in the handle 18a by means of a split pin 36 which projects through the walls of the handle and the flattened part 35 of the rod 33.

An angle bracket 37 has one leg 38 secured to the rear wall of the casing 11 by a pair of bolts 39. The other leg 40 is provided with an L-shaped slot 41 which receives the rod 33 and aids in maintaining the rod 33 in alignment with the valve stem 18. The slot 41 is formed in this particular shape in order to permit the assembly 23 to be inserted into the bracket from the side.

The extension shaft assembly 23 passes through a vertically elongated slot 42 in the back wall of the casing 11. The slot is elongated to permit some up and down motion of the assembly 23, particularly the shroud 27 and sleeve 32 as the valve stem 18 moves up or down under the action of the cam 19. In order to prevent unnecessary movement of the assembly, and thereby minimize rattling thereof in the slot, a spring 43 is provided. One end of the spring is coiled around the rod 28 and abuts the front end of the sleeve 32. The other end of the spring 43 has a loop 45 which is hooked into a pair of apertures 44 in the back wall of the casing 11. The spring 43 inclines upwardly, rearwardly and laterally from its connection with the rod 28 and is of such a length that it is normally under a slight tension. Due to this inclination and tension the spring exerts a force which has components in each of the three directions mentioned and maintains the assembly 23 in a taut condition. In other words, it prevents relative axial movement of the parts at the joints, as well as axial and lateral motion of the horizontal parts of the assembly.

When the knob 22 is turned the movable parts (28, 26 and 33) of the extension shaft assembly cause the rotation of the valve stem 18, and consequently raise and lower the valve stem from its seat by means of the cam 19 acting on the lug 21. During this rotation the shroud 27 prevents twisting or warping of the flexible shaft 26 and thus overcomes any possible back lash caused by such warping or twisting. At the same time the sleeve 32 maintains the rod 28 and adjacent end of the flexible shaft 26 in alignment, and in that way any lost motion due to relative displacement of those parts is eliminated. Relative displacement of the ends of the rods 33 and the adjacent end of the flexible shaft 26 is substantially eliminated by means of the angle bracket 37 which holds the rod 33 against lateral motion in all directions except toward the casing 11.

The spring 43 prevents movement of the assembly toward the casing. There is a slight bending between the two parts 26 and 33 at the joint between them in order to allow the valve stem 18 to move vertically. This bending, however, is very slight, and the amount of back lash or lost motion caused thereby is negligible.

The construction is relatively inexpensive because of the short length of flexible shaft which is used. Inasmuch as flexible shafts of this type are relatively expensive, the less used the cheaper the construction can be made. Instead of a long flexible shaft, rigid rods 28 and 33 are employed for most of the distance between the valve stem 18 and the knob 22.

The structure above described is easily assembled. The shroud 27 is preformed, or in other words, bent to shape before assembly with the other parts. Rods 28 and 33 are easily connected to the flexible shaft 26 by means of the particular joints employed. Furthermore, the entire assembly 23 may be connected together as a unit, one end passed through the casing, the rod 33 inserted in the slot 42 in bracket 38, and the ends of the assembly connected to the knob 22 and valve stem handle 18a. Finally, the spring 43 is hooked into the holes 44.

From the foregoing it will be apparent that this invention provides for remote control of the metering valve and eliminates the lost motion normally occurring between the metering device and the control knob. The entire construction is relatively inexpensive and is quiet in operation.

The scope of the invention is indicated in the appended claims.

I claim:

1. Mechanism for transmitting rotary motion from a driving member to a driven member having non-aligned axes through a support interposed between said members, which comprises two spaced apart rigid rods adapted to be connected at their ends remote from each other to the respective members, a flexible shaft connected at its ends to the adjacent ends of the rods, a rigid shroud substantially coextensive with and surrounding the flexible shaft, means for maintaining one of said rods and the adjacent end of the shroud in alignment, and resilient means engaging said mechanism and said supporting means for biasing both of said rods both axially and radially.

2. Mechanism for transmitting rotary motion from a driving member to a driven member having non-aligned axes through a support interposed between said members, which comprises two spaced apart rigid rods adapted to be con-

connected at their ends remote from each other to the respective members, a flexible shaft connected at its ends to the adjacent ends of the rods, a rigid shroud substantially coextensive with and surrounding the flexible shaft, means 5 for maintaining one of said rods and the adjacent end of the shroud in alignment, and resilient means engaging said mechanism and said supporting means for biasing both of said rods axially.

3. Mechanism for transmitting rotary motion from a driving member to a driven member having non-aligned axes through a support inter-

posed between said members, which comprises two spaced apart rigid rods adapted to be connected at their ends remote from each other to the respective members, a flexible shaft connected at its ends to the adjacent ends of the rods, a rigid shroud substantially coextensive with and surrounding the flexible shaft, means 10 for maintaining one of said rods and the adjacent end of the shroud in alignment, and resilient means engaging said mechanism and said supporting means for biasing both of said rods radially.

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