

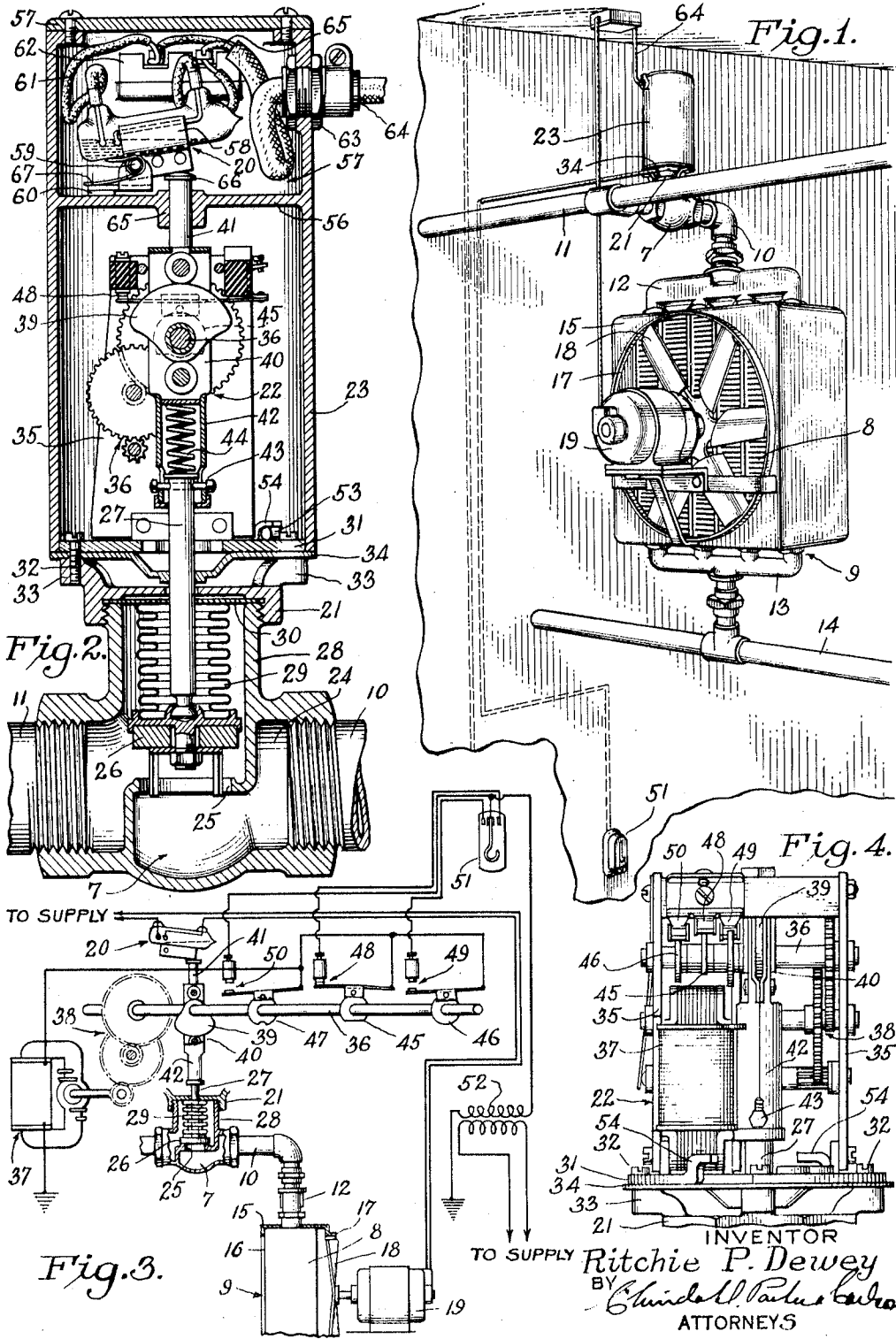
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HEAT CONTROL UNIT

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HEAT CONTROL UNIT

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The invention pertains to a control unit having a motor-driven operator and arranged for the actuation of one or more control devices such as are employed in heat regulating apparatus.

5 One object of my invention is to provide a heat control unit of a novel and advantageous character including a motor-driven operator having a shaft which in successive operating cycles produces the desired actuation of one or more control devices.

10 Another object is to provide in a control unit of the character indicated, an enclosing casing providing in a unitary structure two compartments, one for the actuating shaft, its driving motor and cycling mechanism, and another compartment for a control device in the form of a switch, with a construction such as to permit of convenient access either to the driving motor and associated parts or to the switch.

20 Another object of my invention, generally stated, is to provide an improved control unit which is especially adapted for use as a combined valve and switch operator.

25 Still another object is to provide in combination with a heat control valve or the like having a support for a power driven operator, a cover or casing mounted on the support and removable therefrom so as to permit of convenient access to the operator, together with an auxiliary control switch supported by the cover and arranged for operative association with the power driven operator as an incident to the placement of the cover on such support.

35 A general object is to provide a control unit which is capable of economical manufacture and having its parts so arranged as to permit of compactness and ready accessibility.

40 The objects of the invention thus generally stated together with other and ancillary advantages are attained by the construction and arrangement illustrated in the accompanying drawing forming a part hereof, wherein the invention is shown applied, by way of example, to the control of a unit heater.

45 In the drawing:

Figure 1 is a perspective view showing the control unit applied to a unit heater.

50 Fig. 2 is a fragmentary vertical sectional view through the improved control unit showing the manner of operating a heat regulating valve and also a motor control switch, the switch being shown in elevation.

Fig. 3 is a schematic view illustrating more especially the electrical connections.

55 Fig. 4 is an elevational view of the operator as

viewed from the left in Fig. 2, but with the cover removed.

Referring first to Fig. 1, 7 designates a heat regulating valve controlling a supply of steam or other heating medium to a radiator 8 of a unit heater generally designated by the numeral 9. Said valve 7 is interposed in a pipe connection 10 leading from a steam supply pipe 11 and discharging into an inlet manifold 12.

65 The manifold 12 in turn communicates at spaced points with the upper portion of the radiator 8, which latter may be of any suitable or preferred character and a discharge manifold 13 communicates with the lower end portion of the radiator and connects with a steam return line 14. Surrounding the radiator 8 is a casing 15 having opposed outlet and inlet openings 16 and 17. Associated with the inlet 17 is a fan 18 driven by an electric motor 19.

75 My improved control unit is in the present instance applied to the operation of the heat control valve 7 for controlling the flow of steam or other heating medium to the radiator 8, and to the operation of a switch 20 for controlling the supply of current to the fan motor 19. To this end, the valve 7 is constructed to provide a support 21 for a motor driven operator generally designated by the numeral 22, and removably mounted upon said support 21 is a cover or casing 23 enclosing the operator 22 and providing a support for the switch 20.

80 The valve 7 as herein shown comprises a valve casing or body 24 which provides a seat 25 for a valve member 26, the latter being reciprocable toward and from the seat. Connected with the valve member 26 is a stem 27 projecting through an open side of the valve body formed by a tubular portion 28. A bellows diaphragm 29, secured at one end to the valve member and at its other end to a thin metallic disk 30, provides a seal preventing the escape of steam from the valve casing, the peripheral edge portion of the disk being clamped between the valve portion 28 and the support 21. The latter is in the form of a cap screw-threaded upon the tubular portion 28 of the valve body.

100 The operator 22 comprises a frame having a base plate 31 secured by cap screws 32 to radially extending arms 33 formed on the supporting cap 21, with a disk 34 interposed between the base plate 31 and said arms. The base plate, the disk 34 and the cap 21 are centrally apertured to permit the passage therethrough of the valve operating stem 27, which latter extends upwardly into

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the frame of the operator between spaced side plates 35 thereof.

Mounted in said side plates 35 is a shaft 36 driven by an electric motor 37 through the medium of a spur gear train 38, and fast on said shaft 36 is a cam 39. The latter operates through the medium of a reciprocatory member in the form of a double roller cam follower 40, to impart reciprocation to the valve stem 27 and to a switch operating stem 41 disposed opposite the valve stem 27. For the purpose of operating the valve stem the follower 40 has a yieldable connection with the stem comprising a tubular extension 42 depending from the follower 40 and having a pin-and-slot connection 43 with the stem 27, with a coiled spring 44 enclosed in the tubular extension 42 and interposed between the follower and the stem 27.

The cam 39 is so shaped that in successive half revolutions thereof the valve member is moved from open to closed position or vice versa, and the connection between the follower and the stem is such that after the valve member moves into engagement with its seat the spring 44 yields to permit of an additional downward movement of the follower, thus insuring that the valve member shall be held to its seat with a predetermined pressure.

For the purpose of controlling the driving motor 37 so as to effect successive half revolutions of the cam shaft 36, the latter is provided with a plurality of cam disks 45, 46 and 47, respectively associated with switches 48, 49 and 50. The switches 48 and 49 cooperate with a thermostat 51 for the purpose of initiating valve closing and valve opening cycles respectively. Thus the switches 48 and 49 constitute starting switches from which the control of the motor is transferred to the switch 50 after the cam shaft has started to revolve from one position to another, all in a well known manner. The motor 37 may be of any suitable character but preferably is of the single phase induction type adapted for operation on alternating current at relatively low voltage, a transformer 52 being herein shown as the source.

The enclosing cap or cover 23 for the operator is removably secured upon the base plate 31 in any suitable way as by means of pins 53 carried by the lower end of the cover and engaging in clips 54 struck up from the base plate. When the pins are thus engaged in the clips the lower end of the cover bears upon the periphery of the disk 34, and by imparting a slight rotational movement to the cover it may be disengaged readily for removal.

The switch 20 controlling the supply of current to the fan motor 19 is preferably of the mercury tube type in view of the fact that the motor 19 is relatively large and operates at full line-voltage. Also for this reason, the cover 23 is preferably constructed to provide a separate enclosing compartment 55 for the switch 20 in addition to the main compartment enclosing the operator.

To provide the switch compartment 55 in the cover, it is made in the form of an elongated cylindrical casing having a transverse partition 56 spaced from its upper end which is closed by a detachable cover plate 57. The switch is mounted within this compartment through the medium of a cradle 58 pivoted at 59 on a bracket 60, which is secured on the partition 56, the switch terminals being connected by suitable flexible conductors 61 to a switch block 62 mounted on the inner peripheral side wall of the compartment pref-

erably near the upper end thereof. Also said peripheral wall is apertured to receive a fitting 63 through which extends a conduit 64 enclosing conductors 65 forming part of high voltage supply circuit for the fan motor 19.

The switch operating stem 41 is in the form of a pin slidable in a bearing 65 formed centrally of the partition 56 and having a head 66 at its upper end bearing against the end of the cradle 58 opposite the pin 59; and associated with the cradle is a coiled spring 67 urging the free end of the cradle against the bearing surface provided by said head. The pin, being axially aligned with the cam follower 40, is arranged to bear upon the upper end of the follower when the cover 23 is secured in position on the support 21.

The proportions are such that when the valve has been operated into its open position (Fig. 2), the switch 20 is closed; and conversely, when the valve is in closed position the switch 20 is open. As a result of this arrangement the power operator, under the control of the thermostat 51 and the associated controlling switch mechanism for the driving motor 37 of the operator, serves to control the supply of heating medium to the radiator 8, and as an incident thereto to control the operation of the fan 18.

It will be apparent that I have thus provided a heat control unit of an advantageous character, having its parts arranged for the sake of compactness and well adapted for the actuation of a plurality of control devices such as valves, switches, and the like, in successive operating cycles. Also, the arrangement permits of the use of an enclosing casing with a separate compartment for a high voltage switch, and the operative connection provided between the switch and the operator permits removal of the casing without encountering difficulty in reinstating the operative relation between the switch and the operator.

I claim as my invention:

1. A combined valve and switch operator comprising, in combination with a valve casing having a valve member reciprocable toward and from a seat in the casing, a supporting frame mounted on said casing and having a removable cover providing a main compartment and an auxiliary compartment disposed in endwise relation to the main compartment opposite said valve casing, a power driven mechanism in said main compartment including a cam mounted on said frame for rotation on an axis extending transversely of the axis of said valve member and operatively connected thereto to impart relatively rapid valve opening and closing movements thereto, a control switch in said auxiliary compartment, and means operatively associated with said cam for operating said switch.

2. A combined valve and switch operator comprising, in combination with a valve casing having a valve member reciprocable toward and from a seat in the casing, a supporting frame mounted on said casing and having a removable cover providing a main compartment and an auxiliary compartment disposed in endwise relation to the main compartment opposite said valve casing, a power driven mechanism in said main compartment including an actuating element mounted on said frame for rotation on an axis extending transversely of the axis of said valve member and operatively connected thereto to move it, a control switch in said auxiliary compartment, and a motion transmitting element also operatively associated with said actuating element for operat-

ing said switch, said motion transmitting element being mounted in the cover for removal therewith.

on an axis extending transversely of the axis of said valve member, a cam follower having rollers engaging on diametrically opposite sides of said cam for reciprocation thereby in opposite directions, means connecting one end of said follower to said valve member, a switch enclosed in said auxiliary compartment, and means associated with the opposite end of said follower for actuation thereby and extending into said auxiliary compartment in operative relation to said switch.

3. A combined valve and switch operator comprising, in combination with a valve casing having a valve member reciprocable toward and from a seat therein, a supporting frame mounted on said casing and having a removable cover providing a main compartment and an auxiliary compartment disposed in endwise relation to the main compartment opposite said valve casing, a power driven mechanism in said main compartment including a cam mounted in said frame for rotation

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