April 23, 1957 C. A. COBB 2,789,784

GAS VALVE

Filed April 1, 1953 2 Sheets-Sheet 1

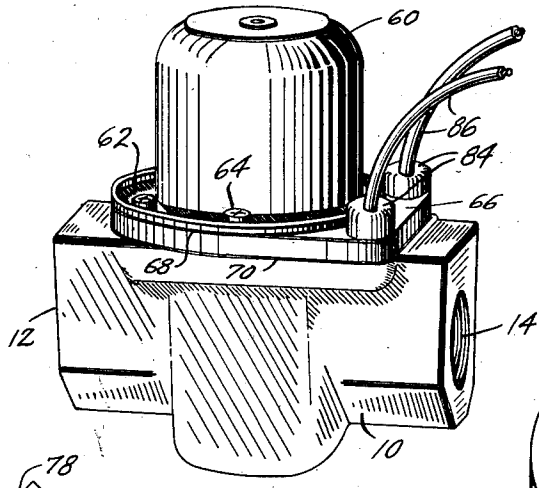


Fig. 1

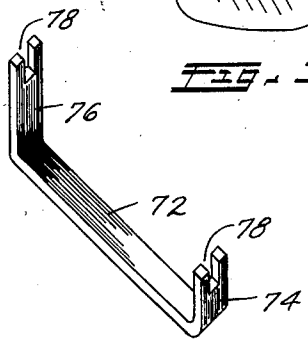


Fig. 5

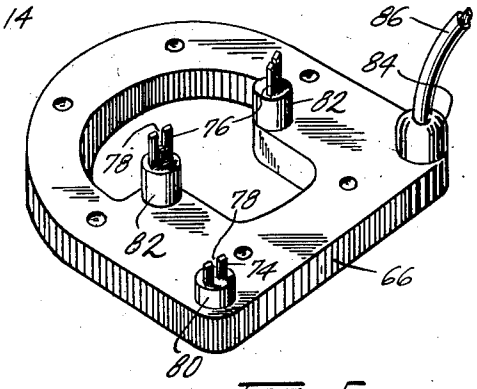


Fig. 6

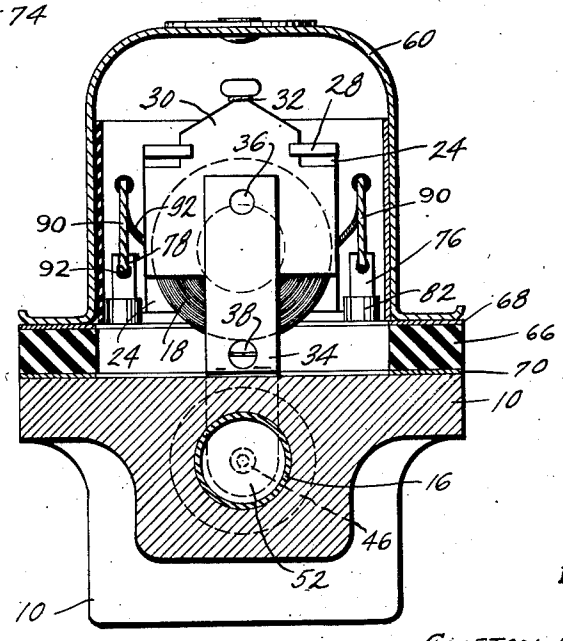


Fig. 7

INVENTOR.

CLIFTON A. COBB

by Bair, Freeman & Molinare

Atty's.

April 23, 1957 C. A. COBB 2,789,784

GAS VALVE

Filed April 1, 1953 2 Sheets-Sheet 2

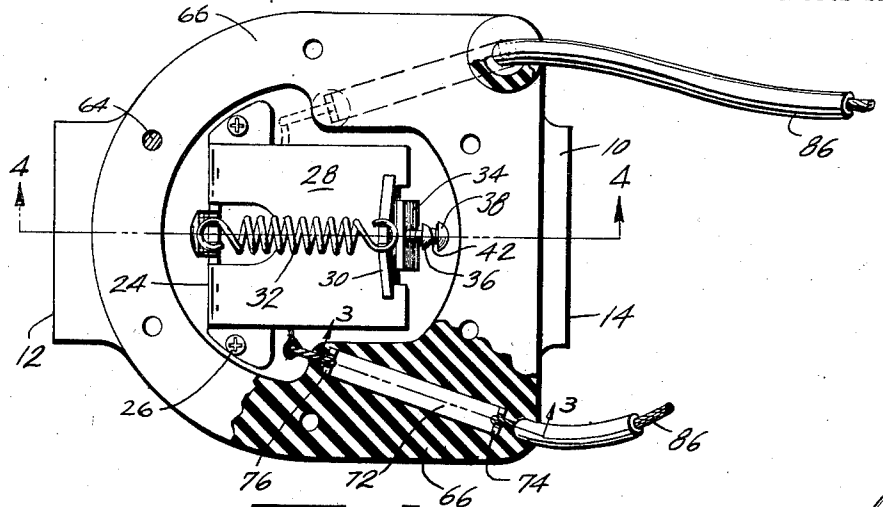


FIG - 2

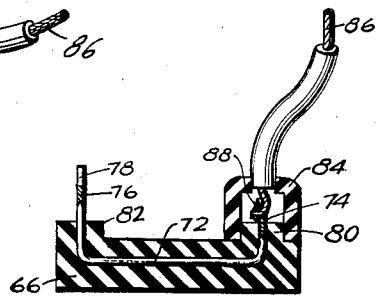


FIG - 3

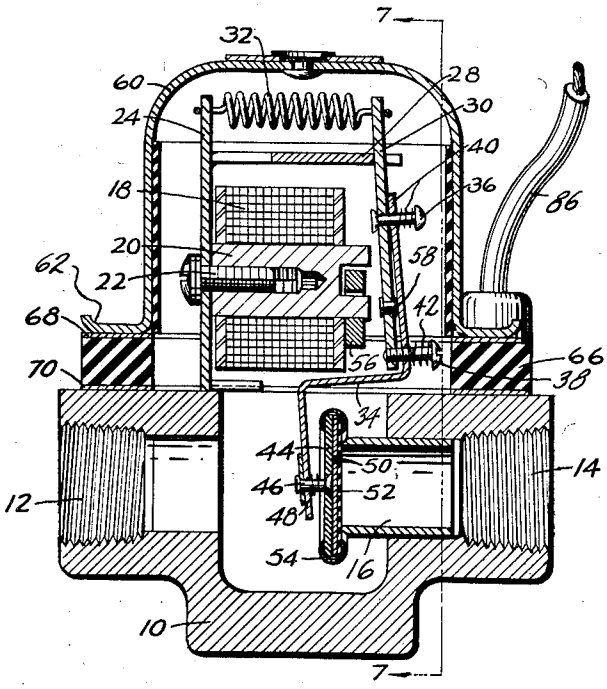


FIG - 4

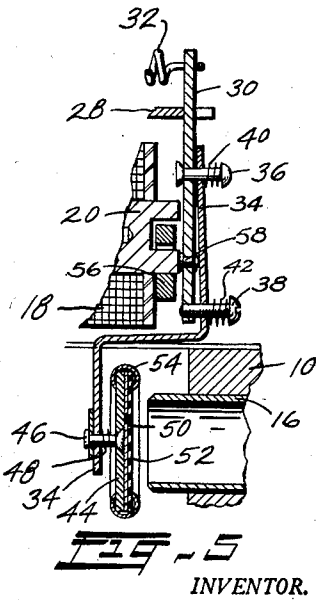


FIG - 5

INVENTOR.

CLIFTON A. COBB

by Bair, Freeman & Molinare

Atty's.

United States Patent Office 2,789,784 Patented Apr. 23, 1957

2,789,784

GAS VALVE

Clifton A. Cobb, St. Joseph, Mich., assignor to Penn Controls, Inc., Goshen, Ind., a corporation of Indiana

Application April 1, 1953, Serial No. 346,099

3 Claims. (Cl. 251—129)

This invention relates to a valve structure and particularly one adapted to serve as an electrically operated gas valve suitable for furnaces, space heaters, clothes dryers, water heaters, etc.

One object of the invention is to provide a gas valve structure in which there is substantially unrestricted flow of gas therethrough when the valve is open, the seat being in alignment with the inlet and outlet of the valve and the valve thereby having greater capacity for its size than the conventional type.

Another object is to provide a relatively small yet high-capacity gas valve which is electrically operated and which is so designed as to secure the maximum in quietness of operation, the valve being suitable for 24 volt operation under automatic control of a room or other thermostat.

A further object is to provide a valve which is electrically operated and in which the electromagnet is interiorly of the valve body so as to be surrounded by the medium that flows through the valve, thus simplifying the mechanical operating connection thereof to the valve disc.

Still a further object is to provide electrical conductors from the outside of the valve body to the electromagnet which are sealed in a special type of electrical connecting device consisting of a plate interposed between the valve body and the housing for the electromagnet and in which current conductors are imbedded, the plate being molded of electrical insulating material around the conductors so that there is no chance for gas flow from the interior of the valve to the exterior thereof along the conductors.

With these and other objects in view, my invention consists in the construction, arrangement and combination of the various parts of my gas valve, whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claims and illustrated in the accompanying drawings, wherein:

Figure 1 is a perspective view of a gas valve embodying my present invention.

Figure 2 is an enlarged plan view thereof with a housing for the electromagnet removed, parts of the valve being broken away and other parts being shown in section.

Figure 3 is a detail sectional view on the line 3—3 of Figure 2 and shows a conductor imbedded in a special molded plate of insulating material.

Figure 4 is a vertical sectional view on the line 4—4 of Figure 2 and shows the valve in the closed position.

Figure 5 is a view similar to a portion of Figure 4 showing the valve in the open position, the electromagnet being energized.

Figure 6 is a perspective view of the special plate of insulating material which I provide with current conductors molded therein.

Figure 7 is a sectional view on the line 7—7 of Figure 4; and

Figure 8 is a perspective view of one of the current conductors per se.

On the accompanying drawing I have used the reference numeral 10 to indicate a valve body. The body 10 has an inlet 12 and an outlet 14 and intermediate the two a valve seat element 16 in the form of a stainless steel tube. The tube 16 is press-fitted into the outlet 14.

For operating the valve, I provide an electromagnet 18 which is wound on a core 20, the core being supported by a screw 22 on a bracket 24. The bracket in turn is secured by screws 26 to the top of the valve body 10.

The bracket 24 has an extension 28 against which an armature 30 is pivotally engaged by a spring 32. A Z-shaped arm 34 is loosely secured to the armature 30 by a rivet 36 and a screw 38 on which are located springs 40 and 42 respectively. The lower end of the arm 34 has loosely mounted thereon a valve disc 44 by means of a rivet 46 and a spring 48. The valve disc 44 is faced with resilient material 52 such as Buna N or the like and interposed between it and the disc 44 is a soft backing 50 of flannel or the like. The assembly is held together by means of a rim 54.

From the foregoing construction, it will be obvious that the spring 32 normally retains the facing 52 of the valve disc 44 seated on the end of the valve seat tube 16 as shown in Figure 4 and may be unseated therefrom by energization of the coil 18. The core 20 of the coil may be provided with a shading ring 56 if the device is to operate on A. C. current and preferably the armature 30 has a stop rivet 58 on non-magnetic material to prevent contact of the armature 30 with the poles of the core 20 when the coil 18 is energized.

To enclose the electromagnet 18, I provide a housing 60 having a flange 62 therearound secured as by screws 64 to the valve body 10. Interposed between this flange and the valve body is a plate 66 of molded insulating material and the housing 60 is sealed relative to the valve body 10 by a pair of gaskets 68 and 70.

The plate 66 may be molded of Bakelite or the like if it is unnecessary for the valve to operate in extremely high temperatures. On the other hand if it is desirable that it operate in temperatures over 800 degrees F., it is preferably formed of a more substantial material such as molded stone, one brand of which is known as "Rosite."

The plate 66 is of special construction and for a special purpose, namely, to provide a means for conducting electric current from the outside of the valve to the interior thereof without gas leakage. To accomplish this, I imbed in the plate, when it is molded, a pair of conductors 72 located substantially midway between the upper and lower surfaces of the plate 66. Each conductor 72 has an upstanding end 74 located outside the housing 60 and an upstanding end 76 located inside thereof. These ends are notched as at 78 (see Figure 8). The plate 66 preferably has a hub 80 surrounding the upstanding portion 74 and a hub 82 surrounding the upstanding portion 76 for reinforcement. Wires 86 for supplying current to the gas valve extend into Bakelite caps 84 and are soldered at 88 to the upstanding part 74 of the strap 72 while interiorly of the housing 60 a lead 90 is soldered at one end to each upstanding part 76 and at its other end to a wire 92 leading to the coil 18.

I have found that when the plate 66 is molded of Bakelite, Rosite or the like with the conductor straps 72 imbedded or molded therein, there is no leakage along the conductor strap from the interior to the exterior of the valve. This makes for a convenient assembly eliminating the necessity of gasketed connections or other means to seal off the interior from the exterior of the valve along current wires which would have to otherwise enter the housing 60 to connect with the electromagnet therein.

In the operation of my valve structure, energization of the coil 18 causes the armature 30 to be attracted

as in Figure 5 and this spaces the valve disc from the valve seat as shown whereupon there is flow of gas around the valve disc as shown by the arrows. Subsequently when the coil is de-energized, the spring **32** effects reclosure of the valve as in Figure 4. Due to the construction described, the closing operation I find is very quiet and superior in this respect to the usual solenoid valve and with much less temperature rise when the coil **18** is energized. The flannel backing **50** for the resilient facing **52** also contributes considerably to quietness.

The seating surface of the valve seat tube **16** is vertical so that it is self-cleaning; whereas the floating mounting provided by the elements **36**, **38** and **46** and their associated springs provides a full floating valve disc that seats properly in all cases without leakage.

The insulating plate **66** with the conductors **72** molded therein provides an economical arrangement for supplying current to the coil in the gas stream without any danger of leakage along the conductors from the interior of the valve to the exterior thereof. These features contribute to provide an economically producible valve of comparatively small size and high capacity.

Some changes may be made in the construction and arrangement of the parts of my gas valve without departing from the real spirit and purpose of my invention, and it is my intention to cover by my claims any modified forms of structure or use of mechanical equivalents which may be reasonably included within their scope.

I claim as my invention:

1. In a valve structure of the type having a valve body adapted to accommodate the flow of fluid therethrough and having an electric valve operator housing mounted on said body, an electric valve operator mounted within said housing at the junction of said valve body and housing, means for conducting electricity from the exterior of said valve body and housing to said electric valve operator comprising a plate of molded insulating material interposed between said valve body and said housing, and conductors imbedded therein.

2. In a valve structure of the type having a valve body adapted to accommodate the flow of fluid therethrough and having an electric valve operator housing mounted on said body and unsealed in relation to the fluid flowing through said valve, an electric valve operator mounted within said housing at the junction of said valve body and housing, means for conducting electricity from the exterior of said valve body and housing to said electric valve operator comprising a plate of insulating material interposed between said valve body and said housing with conductors imbedded therein, and terminal means mounted on said plate at the exterior ends of said conductors.

3. In a valve structure of the type having a valve body adapted to accommodate the flow of fluid therethrough and having an electric valve operator housing mounted on said body, the interior of said housing being unsealed in relation to the fluid flowing through said valve, an electric valve operator mounted within said housing at the junction of said valve body and housing, means for conducting electricity from the exterior of said valve body and housing to said electric valve operator comprising a member formed of electrical insulating material interposed between said valve body and said housing with conductors imbedded therein, terminal means mounted on said member at the inner terminus of said conductors adapted to be connected to said electric valve operator, and terminals mounted on said plate at the exterior terminus of each of said conductors.

References Cited in the file of this patent

UNITED STATES PATENTS

1,072,523	Steinberger	Sept. 9, 1913
2,013,439	Gauger	Sept. 3, 1935
2,238,401	Shaw	Apr. 15, 1941
2,461,615	Taylor	Feb. 15, 1949
2,496,638	Ray	Feb. 7, 1950
2,509,701	Smith	May 30, 1950
2,622,622	Ray	Dec. 23, 1952