

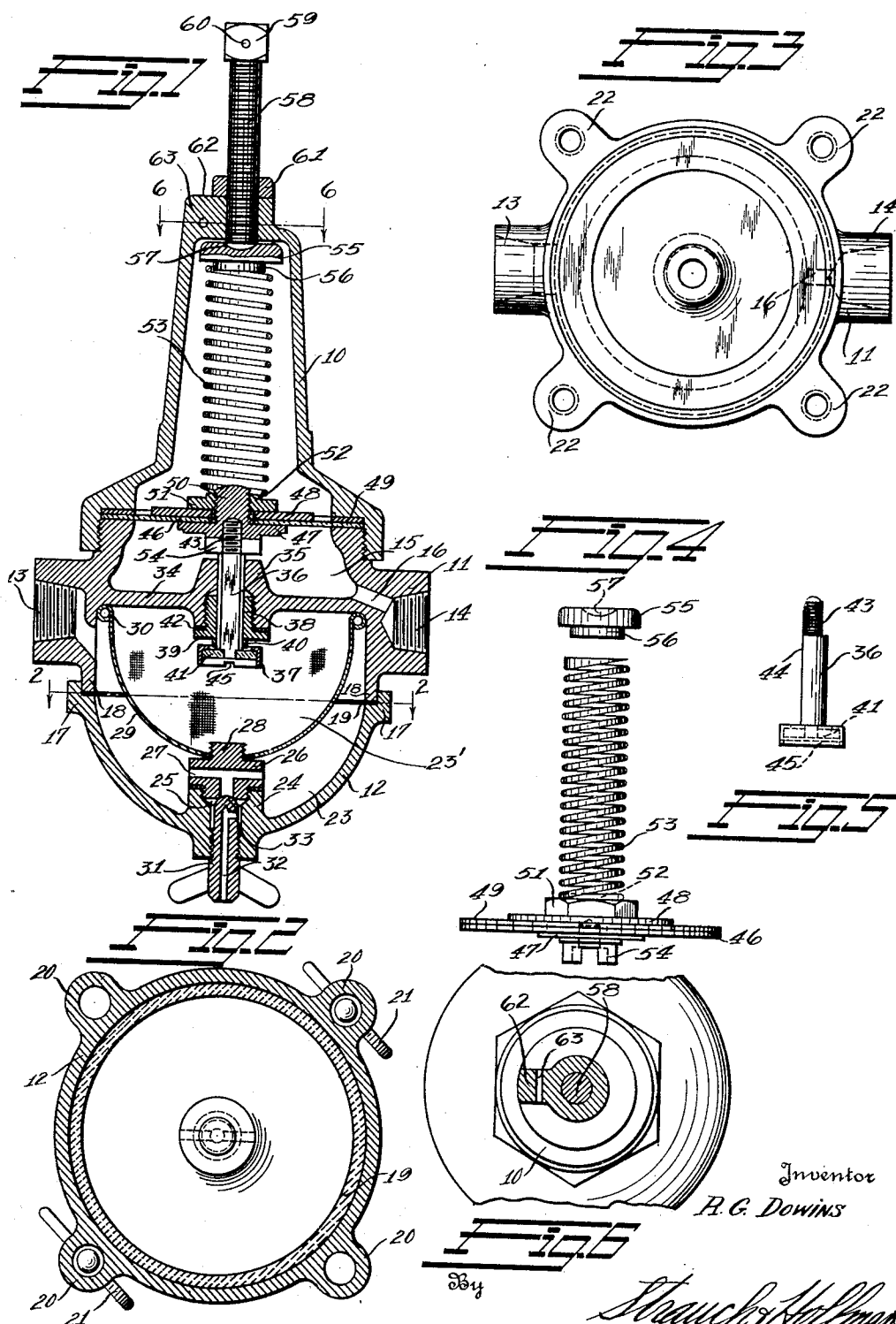
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COMBINED STRAINER AND REGULATOR FOR GAS REFRIGERATING APPARATUS

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COMBINED STRAINER AND REGULATOR FOR GAS REFRIGERATING APPARATUS

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This invention relates to combined strainers and fluid pressure regulators especially adapted for use with gas refrigerators, although by no means limited to refrigeration uses.

In present practice it is usual to embody a pressure regulator and a strainer or filter, as separate units or elements in many constructions, as for example in gas refrigeration structures. Building these members as separate units involves a needless duplication of parts and increases the number of joints necessary in the pipe line, thus increasing leakage. My invention has for one of its objects the housing of these two members, strainer and regulator, in one unit, thus requiring a fewer number of parts which greatly reduces the cost of building the two necessary units. By joining the two in one unit, the number of joints in the pipe line is considerably reduced and the possibility of leakage is thereby minimized. In addition, the reduction in the number of joints reduces the difficulties in assembling the mechanism and in cleaning out sediment from the parts.

By my invention the difficult cored inlet and outlet passages so frequently necessary in the separate type of construction are done away with and the yoke member used to carry the valve in the regulator, a difficult type of construction, is also unnecessary. In my combined strainer and regulator the sediment is deposited on the outer or convex surface of a hemispherical filter member and the sediment is very easily washed off by unscrewing a few thumbscrews and running water through the screen from the inside, which is a very simple and readily accomplished way of easily removing accumulated sediment.

In the drawing which forms a part of this specification and to which reference is hereby made:

Figure 1 is a longitudinal section taken along the longitudinal center line of my combined strainer and regulator.

Figure 2 is a horizontal cross-sectional view taken on the line 2—2 of Figure 1 with the strainer and drain valve removed.

Figure 3 is a plan view of the central or body member of the combined strainer and regulator casing of Figure 1 with the diaphragm assembly and valve removed.

Figure 4 is an elevational view showing the diaphragm assembly, spring, and spring follower.

Figure 5 is an elevational view of the valve and valve stem.

Figure 6 is a cross-sectional view substantially on the line 6—6 of Figure 1.

From the drawing it will be noted that the device is housed in three housing members which may be of cast metal or any other suitable structural material. In practice, brass is very desirable, or it may be made of cast iron covered with a bronzing preparation to prevent rusting. The top casting 10 contains the valve regulating structure; the body casting 11 contains the inlet and outlet connections and has provision on the upper side for a regulator diaphragm and in the lower side a reception cavity for a strainer; the bottom casting 12 supports the strainer and drain mechanism, and acts as a closure for the regulator valve.

Threaded inlet bore 13 is formed in body member 11, and threaded outlet bore 14 communicating with the diaphragm chamber 15 through bore 16 is similarly formed in member 11.

Bottom member 12 is formed with an extending lip or flange 17 which is formed to provide a seat for the lower annular portion 18 of the body casting. This annular portion seats on a rubber band 19 which forms a leak tight connection between the two castings 11 and 12. The lip or flange 17 is provided with four apertured lugs 20 (Fig. 2), through each of which lugs a wing bolt may be slipped. Each of these wing bolts is adapted to screw into screw threaded lugs 22 (Fig. 3) formed on the lower annular part 18 of the body casting 11. When these wing bolts are inserted and tightly screwed up the two members 11 and 12 are held tightly and because of rubber ring 19, in a leakproof abutting relationship. When it is desired to remove the bottom cover or cap 12 to clean out the accumulated sediment

or to repair or clean the strainer, all that it is necessary to do is to unscrew the four thumbscrews 21. It will be noted that the bottom cap or cover 12 acts as a sediment trap, the sediment or dirt dropping down into space 23 where it does not tend to plug up the drain valve openings.

The cover member 12 is formed with an upstanding protuberance 24, which is bored out as shown at 25 to form a threaded seat for the reception of a drain outlet plug 26. This drain outlet plug 26 is bored out as shown at 27 to provide a drain opening. The upper surface of member 26 is provided with a threaded bore 28 on which a strainer member or screen 29 is adapted to be screwed down, thus seating it and holding it firmly in place. The screen or strainer is provided with a roller lip or edge 30 which abuts up against and fits accurately into the lower surface of body member 11.

The protuberance 24 is bored out as shown to provide a screw threaded seat for a drain valve 31 which comprises a wing bolt. This bolt is bored out as shown at 32 to provide a drainage opening. The bolt 31 is provided with a rounded end portion 33 which forms the valve stopping off the opening 27 when the bolt is screwed all the way up, the rounded end 33 tightly abutting plug 26. When the bolt or thumbscrew is turned the drain outlet is opened and a bypass is established from sediment chamber 23 so that the operator can readily determine whether the water is flowing or whether the chamber needs cleaning.

The body casting 11 is formed with a bottom 34, that forms a dividing partition in the device and is formed with an upstanding portion 35 which provides a stop for the deflection of the diaphragm assembly when under stress of the pressure spring. The valve stem 36 of the valve 37 extends up through an aperture in this upstanding portion 35. The lower end of member 35 is provided with a threaded bore of larger diameter than the aperture extending all the way through the member, and into this threaded bore as shown, is screwed the valve seat member 38, which provides a seat for valve 37. As shown the valve stem 36, extends upward through a hole formed in this member which hole is in alignment with the hole formed in member 35, and the lower surface 39 of this member, is provided with an extending sleeve 40, forming the valve seat, which coats with the rubber insert 41 in the valve 37 to form a fluid tight arrangement when the valve is closed. Between members 35 and 39 may be inserted a washer 42.

Valve 37, as shown in detail in Fig. 5 is in the form of a screw threaded bolt with a threaded portion 43 which is adapted to screw into the diaphragm assembly as shown in Fig. 1. One portion 44 of the bolt is cut away

to provide a gap between the valve stem and the valve stem housing so that a passage exists from the regulating valve chamber 23 into the diaphragm chamber 15. The head of the bolt is hollowed out and filled with a rubber or fiber composition 41, that coats with projecting sleeve 40 to form a leaktight closing when the valve is closed. The head of the bolt which forms the valve 37 is provided with a slot 45 which allows the insertion or removal of the valve by the use of a screw driver.

The diaphragm assembly is held between the top cover member 10 and the body member 11, the top member being screwed down on the body member as shown. The diaphragm 46, as shown in Fig. 1 and in the elevational view of Fig. 4, is held between brass diaphragm pans of washer type 47 and 48. The diaphragm 46 may be made of leather or of a rubberized fabric, and is held spaced from top cover 10, on its upper surface by a brass washer or ring 49. The lower diaphragm pan member 47 is shown provided with a threaded cylindrical projection 50 on which is screwed down attachment unit 51 holding the entire assembly in a tight abutting relation. Nut 51 is provided with a projection 52 over which spring 53 is adapted to slip, the fit being so tight that the spring is securely held to the nut by the contact above. The lower pan member 47 is formed at its lower end of crown like or miter form as shown at 54, and is provided with a threaded aperture into which the threaded portion 43 of valve stem 36 is adapted to screw, thus securing the valve to the diaphragm assembly. The radial slot is provided in extension 54 to allow a free passage of liquid from the aperture around the valve stem 36, when the diaphragm assembly 46 is deflected under the pressure of spring 53.

At the upper end of spring 53 is placed the brass spring follower 55, provided with a protuberance 56 that exactly fits the upper end of the helical spring. The spring follower 55 is shown indented with indentation 57 against which adjustment screw 58 bears. This adjustment screw is provided with a square head 59, with a hole extending there-through 60, and a lock nut 61 is adapted to bear up against the top cover 10. The upper surface of this top cover 10 is provided with a radially extending rib 62, formed with an aperture 63. Through holes 60 and 63, a sealing wire may be passed, and when the seal is set in place the adjustment of the screw is held against tampering or accidental displacement. As clearly apparent from the construction, by loosening the lock nut 61 and rotating screw 58, the degree of compression or expansion of springs 53 may be varied and the pressure applied to diaphragm 46 adjusted. In this way the operation of valve 37 may be adjusted, and the outlet pressure

of the fluid pressure regulator changed to suit the needs of the installation.

In operation the fluid of which the pressure is to be regulated, which in the gas refrigeration practice is water, comes in through inlet 13 and passes into the sediment chamber 23; from there it passes through the screen or filter 29 into regulating valve chamber 23', depositing all the dirt and other solid impurities on the outer convex surface of the hemispherical screen 29.

From there it passes up through the regulating valve 37 which is held in open position by the spring 53 pressing down on the flexible diaphragm 46. The fluid now enters diaphragm chamber 15 and exerts a pressure on the flexible diaphragm 46, tending to compress the spring 53. Eventually the spring is compressed sufficiently by the fluid pressure to force the valve 37 up against the projecting sleeve 40, thus closing the valve, sleeve 40 coacting with the rubber filler 41 to securely close the valve and stop off the fluid flow.

The valve remains in this position until fluid is drawn from the outlet 16, which lowers the pressure in the diaphragm chamber 15 and allows the spring 53 to force diaphragm 46 downwardly, and valve 37 away from its seat 38 until a state of equilibrium between the spring force on one side and the fluid pressure on the other has been established. The adjustment screw 58 rests on the spring follower 55 and may be adjusted to change the delivery pressure of the regulator to suit the demand as explained above.

When the valve 37 is forced away from its valve seat 38, the fluid again flows up through the channel formed by the cut away portion of valve stem 36 and the aperture in member 35, and again enters the regulator chamber 15. When sufficient pressure has been built up in this chamber to force diaphragm 46 upwardly against the action of spring 53, the valve is again closed and flow of fluid into chamber 15 is again stopped. Thus the outlet pressure is regulated and the device is automatic in its operation.

When the drain valve 31 is opened fluid is allowed to flow from the bypass 27 out through the outlet 32, and by this means the operator can readily determine whether the fluid is flowing in sediment chamber 23 or whether the chamber needs cleaning. It will be noted that the screen is very readily removed by unscrewing it from support 28 and the accumulated foreign matter may be readily washed from the removed screen by running water through it from the inside.

It will be appreciated that I have herein disclosed a combined regulator and strainer, together in one unit, which requires a fewer number of parts than the usual type of separate construction. By it all unnecessary joints have been done away with, thus reduc-

ing the danger of leakage and also facilitates the assembly and cleaning of the mechanism. The device is very readily taken apart for cleaning or repair, and the regulator valve and the screen may be taken out without affecting the diaphragm. The regulator is an efficient automatic outlet pressure regulator, and the outlet pressure may be very easily changed or adjusted by manipulation of an adjustment screw. The device is very readily disassembled and no difficult constructions are necessary because of the simplicity of the design, which also allows the combined regulator and strainer to be built at low cost.

It will be appreciated that the invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiment is the best known to be, but it is intended to be considered as illustrative and in no sense restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description. Thus for example, it is to be understood that I am not limited to any particular structural material for any of the parts, by reason of any statement in the foregoing specification as to the material of which they are formed in this embodiment, and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

What I claim and desire to secure by United States Letters Patent is:

1. In a combined pressure regulator and strainer, a housing having an open bottom and closed top; an apertured partition disposed in said housing and dividing the same into high and low pressure chambers; a flexible diaphragm disposed in said housing above said aperture; a pan member operatively associated with said diaphragm; a valve having the stem thereof extending through said aperture and threaded into said pan member; a closure for the bottom of said housing, said closure having a screen disposed therein, the lower edge of said housing defining a downwardly facing seat against which the upper edge of said closure seats in sealing relation, the upper edge of said screen abutting against the lower face of said partition and encompassing said aperture; and releasable means for holding said closure and screen in clamping engagement with their respective seats, whereby when said means are released, said closure and screen may be dropped away from said housing and said valve may be unscrewed and removed from the device for purposes of cleaning or grinding.

2. In a combined pressure regulator and strainer, a housing having an open bottom and closed top; an apertured partition disposed in said housing and dividing the same into high and low pressure chambers, a valve member extending through said partition

aperture having a head disposed below said partition and cooperating therewith to control fluid flow through said aperture from said high pressure chamber into said low pressure chamber; fluid pressure controlled means associated with said valve member for controlling the movement thereof; a substantially cup-shaped closure for the open bottom of said housing, a substantially cup-shaped screen located within said closure, said closure and screen being disposed in spaced, nested, cooperating relationship; the lower edge of said housing defining a downwardly facing annular sheet against which the upper edge of said closure seats in sealing relation; the upper periphery of said screen seating against the lower face of said partition in sealing engagement therewith; means for detachably holding said closure in clamping engagement with its seat, and means located on the inner wall of said closure member near the apex thereof for supporting said screen in clamping engagement with its seat whereby, when said means are released said closure and screen may be dropped away from the housing for cleaning or other purposes and at the same time said valve may be operated upon.

In testimony whereof I affix my signature.

R. G. DOWINS.