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WATER PROTECTION OF PRESSURE GOVERNORS FOR PIPE LINES

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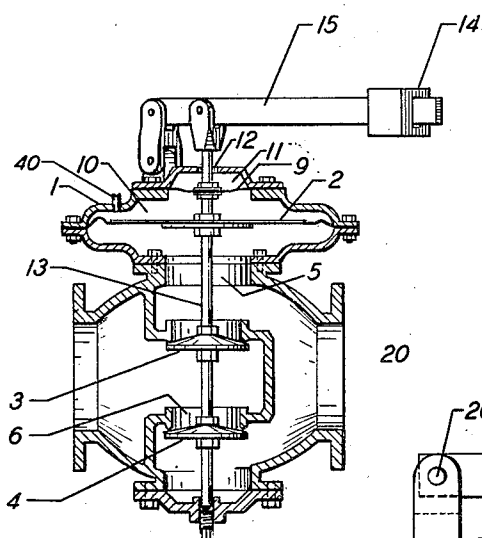


FIG. 1

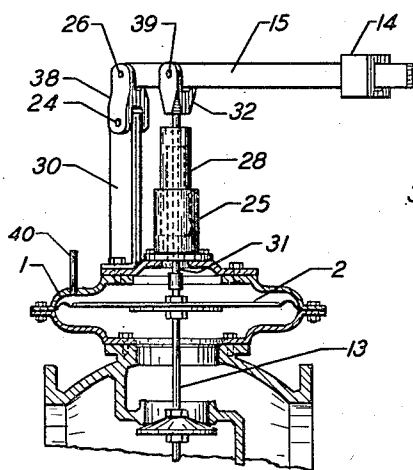


FIG. 2

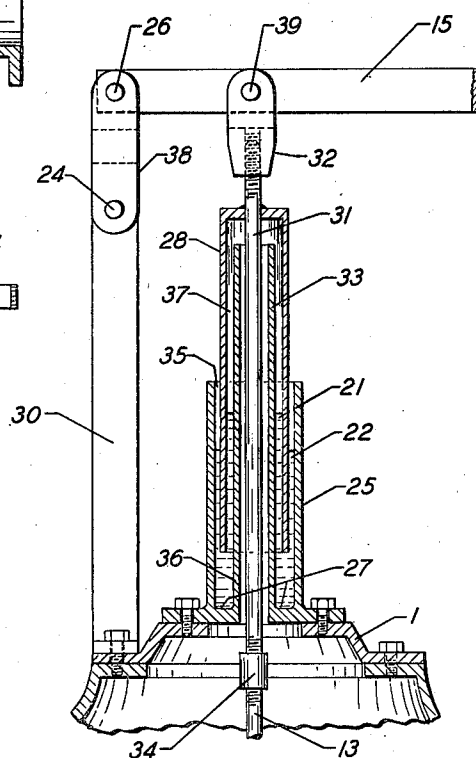


FIG. 3

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WATER PROTECTION OF PRESSURE
GOVERNORS FOR PIPE LINES

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1 Claim. (Cl. 50—27)

This invention relates to a new and useful improvement in the method for preventing access of water to the inside mechanism of the membrane-type pressure governors valves which usually are located underground. Another important feature of my novel hydrostatic mercury seal is, the elimination of incidental loading of the main operating diaphragm of the valve by influence of the weight of water. It is known in the fuel gas industry, that the pressure governor valve is a delicately balanced mechanism on the pipe line for the maintenance of a steady and predetermined pressure of the gas supply to the customers. A small increase of the load and average pressure on operating diaphragm of the governor valve is liable to cause great inconveniences in appliances in households and factories which depend on even pressure of fuel supply.

The old means for the prevention of the access of water to the moving mechanism of the governor applies an inner flexible membraneous material, fastened to the inner surface of the protecting housing of the mechanism, forming a part of its entity. This water-proofing membrane is pierced through by the main operating stem which also protrudes through the guiding open hole of the housing. This membrane is actuated together with the main operating stem being attached to it.

This flexible and perishable membrane of the otherwise rigid housing is the part which is causing detrimental disturbances in the equilibrium of the governor mechanism. When pressure is exerted on it by the surrounding water, the balanced condition of main diaphragm suffers either by overloading of the water-proofing membrane, or by a break through this water-proofing membrane when not being able to withstand the pressure of the surrounding water, which intrudes into the housing through the open guide hole.

According to my invention, means is provided to prevent the slightest occurrence of hydrostatic pressure on the main diaphragm or on any other part of the inside mechanism of the pressure governor valve. This arrangement must be distinguished from that arrangement which may be located on the auxiliary moving mechanism, which is essentially a secondary source of the moving power by helping in the valving action of the poppet valves, but itself does not contain any valve mechanism. Furthermore, by eliminating this perishable water-proofing membrane from the inside of the housing and installing an inorganic metal and metallic liquid water-proof-

ing means on the outside of the housing—no aqueous or atmospheric conditions—nor tear and wear or fatigue of the material—can affect this water-proofing means, as affected by the old membraneous water-proofing—which periodically has to be replaced, because of the above mentioned shortcomings. These and other features will more clearly appear from the following detailed description of an embodiment thereof and the appended claim.

In the drawing,

Fig. 1 is a diagrammatic arrangement of the gas governor mechanism with the old water-proofing method.

Fig. 2 shows the improved water-proofing method of the pressure governor, or named also as regulator, or which a part is represented only on the drawing.

Fig. 3 is a cross section of the hydrostatic mercury seal and its method of application to the housing body of the valve mechanism of the pressure governor.

In the old arrangement, only an exposed flexible membrane 9 within the housing 1 acts as means of water-proofing for the main diaphragm 2, and for the ports 5, 6 and their regulating poppet valves 3, 4.

It is self-evident, that while the water-proofing membrane 9 is intact, water cannot penetrate into the inner chamber 10 of the housing 1 where the main regulator diaphragm 2 is located. Through the open stem guiding hole 12, water can enter into the outer chamber 11 and build up hydrostatic pressure on the main diaphragm. This excess pressure, by depressing the attached operating stem 13, and connected valves 3, 4 offsets the prearranged balance of forces between the gas pressures under the main diaphragm and the control weight 14 located on the operating lever arm 15. Under the unbalanced pressure conditions the opened port holes 5, 6 allow more gas to go through, and cause an unrequired increase of pressure on the discharge side 20 of the regulator.

In Fig. 2 and Fig. 3, the hydrostatic mercury seal 27 is shown on the exterior of the regulator housing 1 in connection of a stay bar 30, both being attached to the outer surface of the regulator housing 1. Obviously, hydrostatic pressure cannot affect the operation of the regulator stem 13 and main diaphragm 2 when water engulfs the pressure governor, only it can cause a certain displacement of the mercury levels 21, 22 in the two passages 35, 37 of the mercury containing vessel 27, which passages are separated by the tele-

scopically operating center pipe 28. The lower portion of this telescopic pipe 28 is continuously submerged in the mercury bath 36, which by its nature as a seal prevents the communication of the air, water or the medium carried by the attached pipes between the mercury filled outer and inner passages 35, 37 of the mercury seal, which for the same presents itself as a metallic wall between the outside atmosphere and the inside light of the valve housing and connected pipes. Simultaneously, the mercury due to its viscosity permits a frictionless operation of the partially submerged telescopic pipe 28 and entirely free motion of the coaxial extension 31 of the valve stem 13.

For the maintenance of a concentric position of the telescopically operating pipe 28 between the inside and outside pipe walls 33, 25 of the mercury containing vessel 27, the lower end of the usual pivotal yoke 38 is attached to the upper end of the stay bar 30 by means of a pivotal pin 24. The upper end of this pivotal yoke 38 contains a pin 25, to which as a fulcrum, the weight 14 carrying balancing lever arm 15 is attached. To an intermediate point of this balancing lever arm is attached pivotally by means of a clevis 32 and pin 39 the upper end of the extension 31 of the valve operating stem 13. Around this extended valve stem 31 are built up the concentrically placed pipes and mercury of the apparatus which is known as hydrostatic mercury seal. The upper end of atmospheric vent 40 terminates over flood level.

In recapitulation, the invention has for its object a new method and application for the pro-

tection of membrane type pressure governor valves against water hazards.

What I claim as new, is:

In a pressure governor for pipe lines for gases and the like, having a casing, a valve in said casing for regulating the passage of the gas or the like through the pipe line, a membrane in said casing being part of the mechanism to control the operation of the valve, said casing having an opening over said membrane, a rod of the valve control mechanism projecting through that opening and being secured to said membrane, means to exert a pre-determined force on the upper end of said rod and on said membrane therethrough, in combination with means to prevent the ingress of a fluid through said opening over said membrane comprising a broad cover for said casing over said membrane, said hole for said rod being provided substantially over the center of said membrane and substantially in the center of said cover, two stationary concentric tubes secured on said cover around said hole, said rod passing through the inner one of said tubes, a bell tube carried by the upper part of said rod being telescopically movable in the space between said two stationary tubes, a heavy sealing liquid, like mercury, in said space, a stationary post secured on the cover spaced apart from said hole and said tubes, an arm pivotally and transversely secured to the upper end of said rod, a pivoted link between one end of said arm and the upper end of said post, and a weight on said arm towards its free end outside of said central pivot.

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