Aug. 5, 1924. 1,503,664

R. B. RICHARDSON

GOVERNOR FOR CONTROLLING GAS FLOW

Filed Oct. 16, 1922

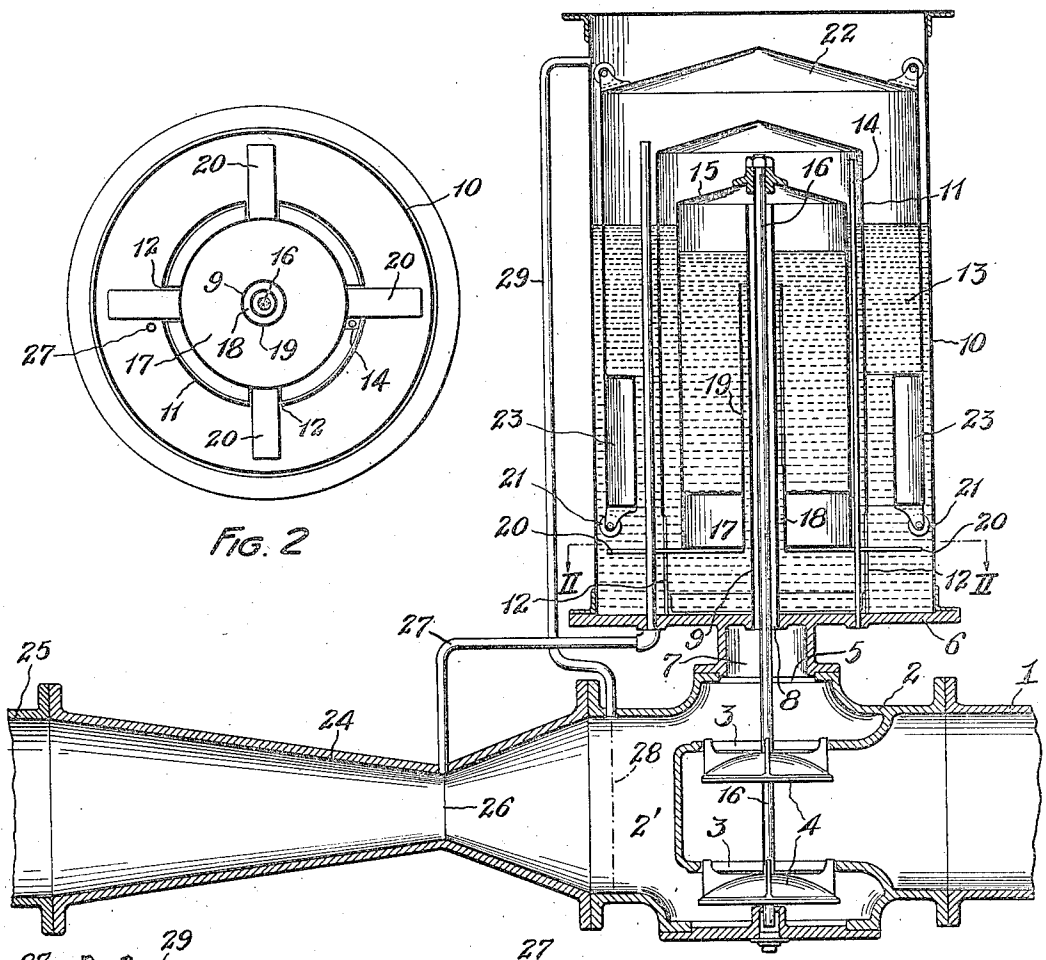


FIG. 1.

FIG. 2

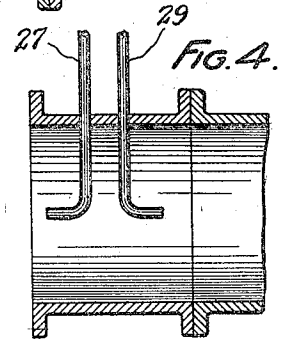


FIG. 4.

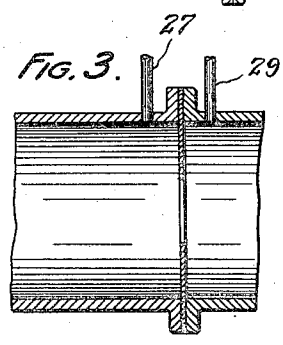


FIG. 3.

INVENTOR
Ralph B. Richardson,
BY
ATTORNEY

Patented Aug. 5, 1924. 1,503,664

UNITED STATES PATENT OFFICE.

RALPH B. RICHARDSON, OF PEORIA, ILLINOIS, ASSIGNOR TO THE GAS MACHINERY COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO.

GOVERNOR FOR CONTROLLING GAS FLOW.

Application filed October 16, 1922. Serial No. 594,836.

To all whom it may concern:

Be it known that I, RALPH B. RICHARDSON, a citizen of the United States, resident of Peoria, county of Peoria, and State of Illinois, have invented new and useful Improvements in Governors for Controlling Gas Flow, of which the following is a specification, the principle of the invention being herein explained, and the best mode in which I have contemplated applying that principle so as to distinguish it from other inventions.

My invention relates to means for controlling the flow of gas, its object being to supply a required volume of gas in a gas distribution system, at periods of heavy demand.

The said invention consists of means hereinafter fully described and particularly set forth in the claims.

I am aware that devices have heretofore been used for accomplishing this purpose.

More specifically, the object of my invention is to simplify the construction of this class of devices and increase their efficiency of operation.

I accomplish my said object by providing a reducing valve of well known construction and which includes a floating bell operated by the difference in pressure between the low pressure main and the atmosphere, and an auxiliary regulator controlled by a differential pressure produced in the low pressure main, said auxiliary regulator being arranged to oppose the reducing action of the reducing valve when the dynamic effect of the flow of the gas through the main reaches a certain predetermined point.

The annexed drawing and the following description set forth in detail certain means embodying my invention, the disclosed means, however, constituting but one of the various mechanical forms in which the principle of the invention may be employed.

In said annexed drawing:

Fig. 1 represents an axial section of a portion, a gas duct and a governor embodying my invention applied thereto.

Fig. 2 represent a cross-section taken upon the plane indicated by line II—II in Fig. 1.

Figs. 3 and 4 represent detail sections of modified forms of a part of my said apparatus.

In the illustrated embodiment of my invention, a gas supply pipe or high pressure main 1 is connected with any suitable source of supply of gas under pressure, such as the gas plant (not shown). Connected with this pipe 1 is the valve casing 2 in which are the two valve openings 3—3 which are controlled by the double-valve 4. An opening 5 is formed at the top of the casing, and mounted upon such top is a base member 6 having the central opening 7 communicating with opening 5 and a smaller top opening 8 in which latter is mounted the fixed tube 9 open at the top. Fixed to the base member 6 is the outside housing 10 closed at the top. Also fixed to the said base member is the inside housing 11 provided at the bottom with vertical slots 12—12. A seal of water 13 is contained within the two housings and a pipe 14 establishes communication between the interior of the housing 11 and above the water level and the atmosphere.

A bell 15 is attached to the upper end of the valve stem 16 and is provided with an annular air chamber 17 which causes it to float and providing a central opening 18 through which the tube 9 projects. A guiding tube 19 projects upwardly from this opening 18 as shown.

The tube 9 projects into the upper portion of the interior of bell 15 and above the level of water in the bell.

As thus far described, the apparatus embodies an old and well known form of reducing or regulating valve and means for automatically actuating same to maintain constant the gas pressure in the low pressure main 2', as will be understood by those skilled in the art.

Secured to the bottom of the bell 15 are arms 20—20, Fig. 2, projecting radially through the slots 12—12, and into the path of movement of rollers 21—21, secured to the bottom of an outside bell 22, provided with an annular air chamber 23 which causes it to float in the water seal 13 and within the outside housing 10.

Secured to the outlet side of the valve casing 2, and forming part of the low pressure main, is one end of a Venturi tube 24, the other end thereof of which is attached to the service main 25. Leading from the constricted area 26 or throat of said tube, is a pipe 27 which projects into the upper part of the interior of the outside bell 22, and leading from an area 28 intermediate of

said area 25 and the valve 4, is a second pipe 29 leading into the upper part of the interior of the outside housing 10. Area 26 is one of lower pressure than area 28, as will be understood, so that a differential pressure is created between these two areas and hence between the interior of the upper parts of the outside housing 10 and outside bell 22. Under normal conditions the differential pressure is such as to allow the bell 22 to be suspended with the rollers 21 out of contact with arms 20. As the consumption of the gas increases, the velocity thereof through the Venturi tube increases which results in an increase in the difference of pressure between the two areas 26 and 28. As this difference increases the outside bell 22 will be depressed accordingly and when such difference becomes of sufficient or a predetermined amount, such depression will be sufficient to cause rollers 21 to engage the arms 20 and cause the inside bell 15 to be depressed and impart an opening movement to valve 4. This action therefore increases the valve opening and increases the pressure on the outlet side of the valve, thus providing the increased volume required at the points of consumption.

A similar effect would be produced by substituting a reduced orifice for the Venturi tube as shown in Fig. 3 or by substituting a Pitot's tube as shown in Fig. 4.

It is obvious that the Venturi tube or equivalent device may be located at any part of the duct, that is at any location behind or at any location in front of the valve.

What I claim is:

1. The combination of a gas main; a static governor for said main; an auxiliary governor including a movable member having a sealed chamber; and means controlled by the dynamic effect of the gas flowing through said main for producing a differential pressure upon opposite sides of the chamber's walls whereby said member may be actuated to engage said static governor and oppose its reducing action.

2. The combination of a gas main; a static governor for said main; an auxiliary governor including a movable and enclosed liquid-sealed bell adapted when depressed to engage said static governor and oppose its reducing action; means in said main for producing a differential pressure; a duct leading from the area of lower pressure to the interior of said bell, and a duct leading from an area of higher pressure to the exterior of said bell.

3. In means for controlling the flow of gas, the combination of a duct; a valve in said duct; an outside fixed housing containing fluid; a bell floating in said fluid connected with said valve and having its interior communicating with said duct; an inside fixed housing surrounding said bell having its interior communicating with the atmosphere and to which said fluid has access; a second bell floating in such fluid and surrounding said inside housing and having a path of movement intersecting a part of said inside bell; and means for creating a difference of pressure in said duct and on the outlet side of said valve; the interior of said second bell being in communication with said duct and at an area of lower pressure thereof; and the interior of said outside housing being in communication with said duct and at an area of higher pressure thereof.

Signed by me this 10th day of October, 1922.

RALPH B. RICHARDSON.