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ATTACHMENT FOR GAS GOVERNORS

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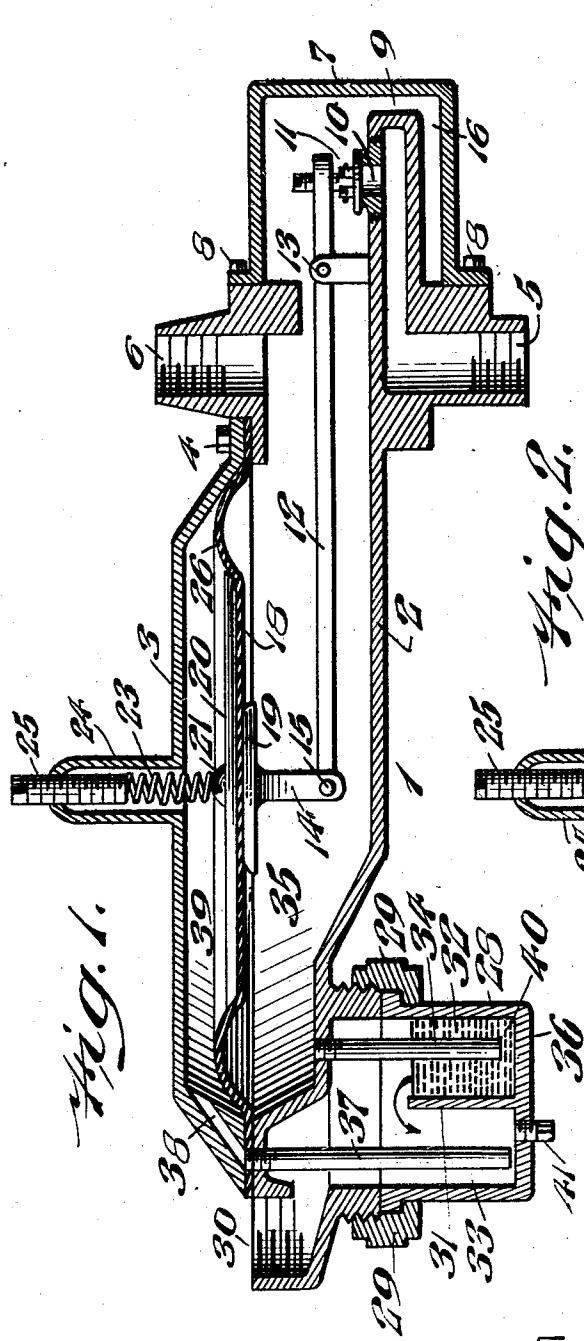

Fig. 1.

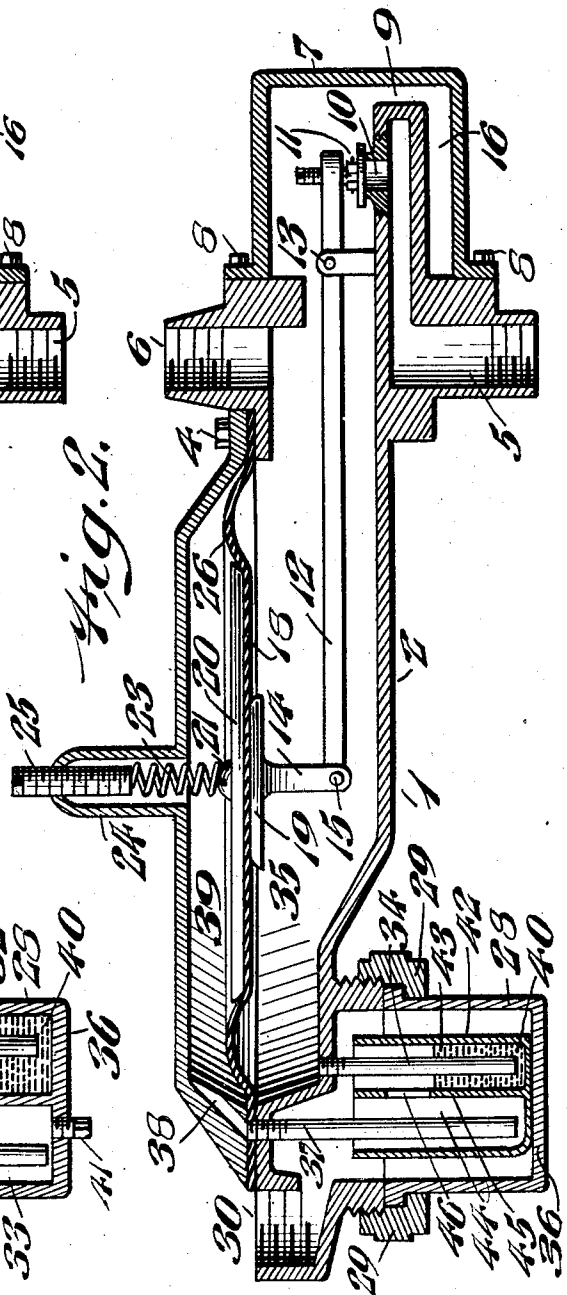

Fig. 2.

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UNITED STATES PATENT OFFICE

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ATTACHMENT FOR GAS GOVERNORS

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My invention relates to a new and useful attachment for gas governor of the general type disclosed in my Patent No. 1,763,376 and employed for controlling and regulating the flow of gas preliminary to its flow through a conventional gas meter which is interposed between the source of supply and the point of use or consumption.

My invention further relates to an attachment for gas governor of this general character which, in addition to controlling and regulating the flow of gas to the desired volume is also adapted to stop the flow of gas entirely, when the consumption of the gas is partially or completely stopped, thereby eliminating all danger of explosion due to an accumulation of unconsumed gas, and at the same time preventing waste of the gas.

My invention further relates to an attachment for gas governor of this character which is equally adapted for use in conjunction with all kinds of gas meters and supply systems without necessitating any alteration of the construction or interfering with the operation of the same.

My invention further relates to a novel attachment embodying the novel and advantageous features of my invention which is adapted for installation on gas governors of future manufacture as well as on conventional gas governors already in actual use to impart to the latter certain novel advantageous functions and attributes not heretofore possessed or accomplished thereby eliminating the necessity of totally discarding governors already installed and rendering the advantages of my novel invention attainable at a minimum cost.

To the above ends my invention consists of a casing having a gas inlet leading from a source of supply, and a gas outlet leading through a gas meter to a point of consumption, there being free communication between said inlet and outlet, a diaphragm transversely dividing said casing into upper and lower compartments, a pipe leading from the lower of said compartments to the atmosphere, a fluid for normally sealing the lower end of said pipe, a pipe leading from the upper of said compartments to the atmosphere and having its lower free end juxtaposed to the free end of said first mentioned pipe, the fluid sealing said first mentioned pipe being adapted to be actuated by the increase of pressure in said lower compartment to seal the pipe leading from said upper compartment from the atmosphere.

My invention further consists of an attachment embodying the foregoing advantageous features which is adapted to be installed upon governors of conventional construction already in actual use and operation.

My invention still further consists of various other novel features of construction and advantage all as hereinafter described and claimed.

For the purpose of illustrating my invention I have shown in the accompanying drawings several forms thereof which are at present preferred by me, since the same have been found in practice to give satisfactory and reliable results, although it is to be understood that the various instrumentalities of which my invention consists can be variously arranged and organized and that my invention is not limited to the precise arrangement and organization of the instrumentalities as herein shown and described.

Fig. 1 represents a vertical sectional view of a governor embodying my invention, certain parts being shown in elevation.

Fig. 2 represents a view similar to Fig. 1 showing a modified form of my invention.

Referring to Fig. 1 of the drawings, which illustrates a novel governor construction embodying my invention, and in which similar numerals of reference indicate like parts, 1 designates the governor casing which is composed of bottom 2 and top 3, suitably secured or assembled as at 4. 5 designates a gas inlet leading from a source of supply (not shown) and 6 designates a gas outlet leading to a point of consumption through a conventional gas meter (not shown). 7 designates a cap secured to the outer walls of the inlet 5 and outlet 6 at 8. Inlet 5 is provided with a U-shaped extension 9 which is provided with the port 10 which is controlled by the valve 11 adjustably carried at one end of the lever 12 which is fulcrumed at 13, and the other end

of which is pivoted to the bracket 14 at 15. The bottom wall of the U-shaped extension 9 of inlet 5 is spaced from the juxtaposed wall of the cap 7 to form a channel 16 for the reception of foreign matter which may be precipitated therefrom due to a decrease in the velocity of the gas. 18 designates a diaphragm which is clamped between the bottom disc 19 carried by the bracket 14 and the upper disc 20, said discs being secured by the screw 21 or its equivalent. 23 designates a spring which extends upwardly through the air-tight boss 24 and the tension of which is regulated by set screws 25, said spring being adapted normally to urge the diaphragm 18 downwardly. The diaphragm 18 is flexible and lags at 26 to permit of upward and downward movement in a manner hereinafter described. 28 designates a cup-like member which is secured to the casing 1 by a union joint 29 or in any other suitable manner, and which is provided with the outlet 30 leading to the atmosphere. The cup 28 is provided with the inner partition 31 which divides said cup into two compartments 32 and 33 said partitions terminating at the point below the upper edge of the cup 28 so that communication is established between the chambers 32 and 33 over the top edge of said partition in the direction of the arrow. 34 designates a pipe or tube leading from the lower compartment 35 formed below the diaphragm 18 and terminating at a point in proximity to the bottom 36 of the cup 28. 37 designates a similar pipe or tube which communicates through the passage 38 with the compartment 39 formed above the diaphragm 18, the lower end of said pipe being positioned in proximity to the bottom 36 of the cup 28. It will be seen that the tube 34 leading from the lower compartment 35 leads into the chamber 32 while the tube 37 leading from the upper compartment 39 leads into the chamber 33. 40 designates a fluid such as mercury, in a predetermined amount, which serves normally to seal the lower end of the tube 34. The compartment 33 is provided with the bottom drain plug 41 which will be hereinafter further referred to.

The operation is as follows:

When the valve 11 is in good working order, the gas flows through the inlet 5 and out through the outlet 6 to the point of consumption. If the consumption of the gas is partly or completely stopped, the excess accumulation of gas in the compartment 35 raises the diaphragm 18, which in turn lowers the valve 11 to close the port 10 to shut off the gas supply automatically. When the pressure of the gas in the compartment 35 has been relieved due to a resumption of the consumption of the gas, the diaphragm 18 is lowered by the spring 23 and by the pressure of the atmosphere with which the compartment 39 above said diaphragm communicates, thereby raising the valve 11 to open the port 10 to permit the further flow of gas through the inlet 5 and the outlet 6, in the usual manner.

To take care of leaks or defects in the valve 11, it has heretofore been the practice to provide the compartment 35 with a safety valve arrangement which permitted the escape of gas accumulated in the compartment when the pressure reached a predetermined limit, thus guarding against the occurrence of explosions, (see Smith Patent No. 1,499,885; Gaunt et al. No. 1,626,581, and others). The disadvantage of this practice, which it is the primary object of my invention to remedy, resided in the fact that when the pressure of the gas in the compartment 35 was relieved (by the escape of the accumulated gas therein into the atmosphere) the diaphragm 18 was lowered (by the spring 23 and the pressure of the atmosphere) and the valve 11 raised, thereby fully opening the port 10 and permitting the free flow of gas into the compartment 35. This resulted in the rapid refilling of the compartment 35 with gas, which in turn escaped into the atmosphere whenever the pressure in said compartment reached the limit to which the device is adjusted.

By my construction (see left hand portion Fig. 1) when the pressure of the gas within the compartment 35 has reached the limit to which the device is adjusted, the mercury 40 is ejected from the tube 34 thus causing an overflow of the mercury 40 from the chamber 32 into the chamber 33, thus sealing the lower end of the pipe 37. The excess gas from the compartment 35 now escapes through the tube 34 to the atmosphere through the outlet 30. Due to the partial vacuum thus created in the compartment 39 (by the raising of the diaphragm 18 by the pressure of gas in the compartment 35) and by sealing the lower end of the pipe or tube 37 to shut off the compartment 39 from the atmosphere, the diaphragm 18 is maintained in its upper position, thereby maintaining the valve 11 in its lower position to close the port 10. In this position of the parts the flow of gas into the compartment 35 is determined by the size of the leak in the valve 11, as compared with the flow of gas through the fully opened port 10 as would be the case were the diaphragm lowered and the valve 11 raised, as in the prior art constructions referred to.

Furthermore, in this condition of the parts, and until the leak in the valve 11 shall have been repaired, the excess gas in the compartment 35 bubbles through the mercury or other sealing fluid in the compartment 32 and escapes to the atmosphere through the tube 34 and the outlet 30, thereby eliminating risk or danger of explosion and without the aid of any safety valve arrangements. Thus, by

providing the tubes 34 and 37 communicating with the compartments 35 and 39 respectively, I provide a vent for the compartment 35 to permit the escape of gas accumulated therein into the atmosphere, and I seal the compartment 39 from the atmosphere to maintain a partial vacuum which tends to retain the diaphragm 18 in its upper position and the valve 11 in its lower closing position, thus reducing the amount of gas flowing into the compartment 35 to the minimum amount flowing past a leaky valve 11 in lieu of the volume of gas which would normally flow through the port 10 when the latter is fully opened by the raising of the valve 11.

In order to guard against the undue and undesired sealing of the compartment 39 and the consequent permanent retention of the diaphragm 18 in its upper position, and of valve 11 in its lower closing position, I space the bottom end of the tube 37 from the bottom of the chamber 33. Thus, if the gas pressure in the compartment 35 should become excessive, but not sufficiently so to justify or warrant the permanent closing of the valve 11, and only a part of the mercury 40 is transferred from the chamber 32 into the chamber 33, the compartment 35 remains sealed and the compartment 39 remains in communication with the atmosphere since the lower end of the tube 37 is spaced from the bottom of the chamber 33 so that, when the temporary congestion of the gas in the compartment 35 has been relieved, the diaphragm 18 may still be lowered to open the valve 11, and is not "locked" in its upper position. In other words, by spacing the end of tube 37 from the bottom of chamber 33, it is necessary that all the mercury 40 should be ejected from tube 34 and into chamber 33 (which can take place only when the pressure in compartment 35 is such as to warrant permanent closing of valve 11) before the compartment 39 is shut off from the atmosphere to maintain the diaphragm 18 in its upper position and the valve 11 in its lower closing position.

The mercury 40, transferred into the chamber 33 may be drained therefrom by removing the plug 41, and is then poured back into the chamber 32 so that the same amount of mercury initially placed in the chamber 32 can be used indefinitely. It is further understood that by controlling the volumetric capacity of the chambers 32 and 33 and the amount of mercury placed therein, the reaction of my novel governor can be regulated or adjusted to any desired degree of pressure within the compartment 35.

In Fig. 2 I have shown a slightly modified form of my invention, wherein I position an inner cup 42 within the outer cup or casing 28, the cup 42 being divided into two chambers 43 and 44 by the partition 45 which has the aperture 46. In this construction the mercury 40 is placed in the chamber 43 (in lieu of the chamber 32) and overflows into the chamber 44 through the aperture 46 in partition 45 into the chamber 44, when the pressure in the compartment 35 below the diaphragm 18 has reached a predetermined limit. The operation of this form of my invention is the same as that detailed in connection with Fig. 1, and it is not necessary to dwell upon it in greater detail.

It will thus be seen that the principle of operation of my invention consists in displacing the sealing fluid initially contained in the tubes 34, to cause an overflow of the sealing fluid contained in the chambers 32 or 42 into the adjacent chambers 33 and 44 to seal the bottom ends of the tubes 37. In order to do this, it is merely necessary to have the chambers 32 and 42 brimful of sealing fluid, and to so regulate the size of the tubes 34 and the spacing of the bottom ends of the tubes 37 from the bottom of the chambers 33 and 44, that when the liquid initially contained in that portion of the tubes 34 which is immersed in the sealing fluid 40 is displaced therefrom, due to the excess pressure in the compartment 35, it will cause the overflow of a sufficient amount of fluid from the compartments 32 and 42 into the compartments 33 and 44 respectively to seal the bottom ends of the tubes 37. After that has been accomplished, any further excess pressure in the compartment 35 will cause the excess gas to escape through the fluid remaining in the compartments 32 and 42 and pass out to the atmosphere through the openings 30.

I am aware that the invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof, and I therefore desire the present embodiment to be considered in all respects as illustrative and not restrictive, reference being had to the appended claims rather than to the foregoing description to indicate the scope of the invention.

Having thus described my invention what I claim is new and useful and desire to secure by Letters Patent, is:—

1. An attachment for a gas governor comprising two chambers separated by a partition, pipes leading from said chambers to said gas governor and a sealing fluid in one of said chambers for normally sealing the end of the corresponding pipe, said fluid being adapted to overflow into the other of said chambers to seal the bottom end of the corresponding pipe, when said fluid is subjected to predetermined pressure.

2. An attachment for a gas governor comprising two chambers separated by a partition communicating with each other and with the atmosphere, pipes leading from said gas governor into said chambers, and a sealing fluid in the bottom of one of said chambers for normally sealing the end of the corre-

sponding pipe, said fluid being adapted to overflow into the other of said chambers to seal the bottom end of the corresponding pipe, when said fluid is subjected to predetermined pressure.

3. An attachment for a gas governor comprising a casing, a partition dividing said casing into two compartments which intercommunicate over the top edge of said partition, pipes leading from said gas governor to said compartments, and a sealing fluid in one of said compartments for normally sealing the lower end of the corresponding pipe, said fluid being adapted to overflow into the other of said chambers to seal the bottom end of the corresponding pipe, when said fluid is subjected to predetermined pressure.

4. An attachment for a gas governor comprising a casing, a partition in said casing dividing the latter into two communicating compartments, a sealing fluid in one of said compartments, a pipe leading from said gas governor and having its free end sealed by said fluid, a second pipe leading from said gas governor into the second of said compartments, the fluid in said first compartment being adapted to be displaced therefrom into said second compartment by the pressure within the pipe leading to said first mentioned compartment to relieve the pressure within said pipe and to seal the lower end of said second pipe.

5. An attachment for a gas governor including a casing and a movable diaphragm dividing said casing into two compartments, said attachment comprising two chambers separated by a partition, two pipes leading from said compartments to said chambers, and a sealing fluid in one of said chambers for normally sealing the end of the corresponding pipe, said fluid being adapted to overflow into the other of said chambers to seal the bottom end of the corresponding pipe, when said fluid is subjected to predetermined pressure.

6. An attachment for a gas governor including a casing and a movable diaphragm dividing said casing into two compartments, said attachment comprising two chambers communicating with each other and with the atmosphere, pipes leading from said compartments into said chambers, and a sealing fluid in the bottom of one of said chambers for normally sealing the end of the corresponding pipe, the ends of both of said pipes being spaced from the bottom of the corresponding chambers, said fluid being adapted to overflow into the other of said chambers to seal the bottom end of the corresponding pipe, when said fluid is subjected to predetermined pressure.

7. An attachment for a gas governor including a casing and a movable diaphragm dividing said casing into two compartments, said attachment comprising two chambers communicating with each other and with the atmosphere, pipes leading from said compartments into said chambers, and a sealing fluid in the bottom of one of said chambers for normally sealing the end of the corresponding pipe, the ends of said pipes being unequally spaced from the bottoms of the corresponding chambers, said fluid being adapted to overflow into the other of said chambers to seal the bottom end of the corresponding pipe, when said fluid is subjected to predetermined pressure.

8. An attachment for a gas governor including a casing and a diaphragm therein dividing said casing into two compartments, said attachment comprising two chambers separated by a partition, and intercommunicating over the top edge of said partition, pipes leading from said compartments to said chambers, the latter having a common outlet leading to the atmosphere, and a sealing fluid in the bottom of one of said chambers for normally sealing the end of the corresponding pipe, said fluid being adapted to be displaced by the pressure within said pipe into the other of said chambers to relieve the pressure within the corresponding compartment of said gas governor and to seal the end of the pipe leading from the other of said compartments from the atmosphere.

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