M. JASPERSEN.

FLUID PRESSURE REGULATOR.

APPLICATION FILED FEB. 2, 1909.

971,275. Patented Sept. 27, 1910.

Fig. 2

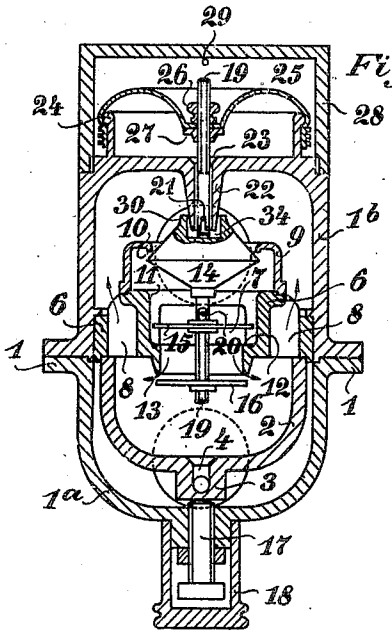



Fig. 1

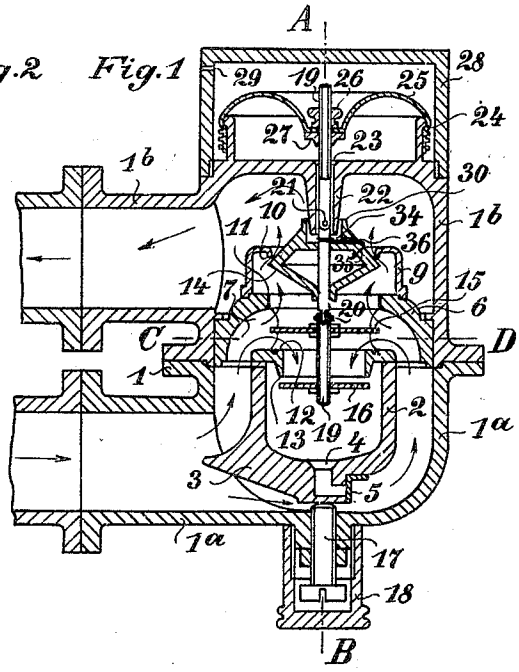



Fig. 3

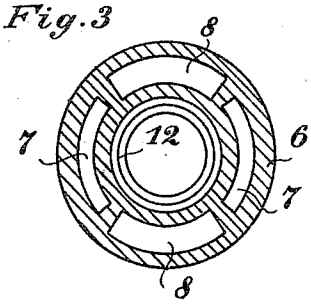
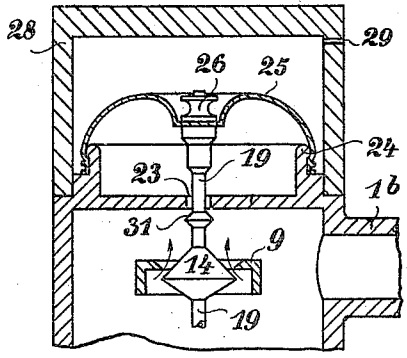



Fig. 4

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# UNITED STATES PATENT OFFICE.

MAX JASPERSEN, OF HAMBURG, GERMANY.

## FLUID-PRESSURE REGULATOR.

971,275. Specification of Letters Patent. Patented Sept. 27, 1910.

Application filed February 2, 1909. Serial No. 475,639.

*To all whom it may concern:*

Be it known that I, MAX JASPERSEN, a subject of the German Emperor, residing at Hamburg, Germany, have invented a certain new and useful Improvement in Fluid-Pressure Regulators, of which the following is a specification.

This invention relates to improvements in devices for regulating the pressure of gases, especially of coal gas heating and power gas in which the extent of opening or closing of the valves is regulated by the rising and falling of a diaphragm or cup which is under the influence of the gas and therefore decreases or increases the gas supply accordingly. The gas which is conducted from the supply pipe to a valve casing flows from this through an upper and lower valve in quantities corresponding to the consumption, into the upper part of the regulator connected with the diaphragm chamber and thence into the conduit pipe leading to the place of consumption. Such devices are already known; they have however, not given satisfactory results owing to the injurious influence on the valves by the current of gas and the precipitation water from the gas as well as owing to the friction of the valve spindle.

The present invention overcomes these objections by providing means which protects the valves from the effect of the direct current of gas; and by so constructing and arranging the valves that they are removed from the path of the water of condensation, which flows in from more elevated positions. The friction created by the movement of the valve spindle is also obviated by suspending the valve carrying spindle from the diaphragm and thereby doing away with all guides and close fitting bearings for the said spindle. It will be apparent therefore, that only the static gas pressure and the regulating diaphragm can act upon the valve, so that all unfavorable influences are done away with. Among the currents of gas which should not be permitted to act directly upon the diaphragm are not only that pressure or current which comes into the passage owing to consumption of gas but also that current which arises through the current of gas streaming from the valve with the force of the difference of pressure and concentrating toward the valve rod in a narrow current. This current is very unfavorable for operating on the diaphragm and therefore in the present invention, devices are arranged which prevent a direct flow of the gas from the valves, into the diaphragm chamber, or make the working of the penetrating gas current ineffectual.

A further injurious influence of the valve can take place if condensed water collects in conduits situated higher up, and reaches the valve. To prevent this, the present invention provides a receptacle in which the precipitation water is caught. This receptacle can be placed in front of the regulator or within it. In the latter case, it can be arranged in front of or under the valve. The precipitation water, flows away into this receptacle without touching the valve. At the bottom of this receptacle there is an outlet channel which is protected against the penetration of the unregulated gas by a plug of wadding or the like, or by a flap valve.

Further objects and advantages will be apparent from the following description with reference to the accompanying drawing, wherein,

Figure 1 is a view in vertical section of a pipe main embodying the present invention; Fig. 2 is a view in vertical section on the line A—B of Fig. 1; Fig. 3 is a view in vertical section on the line C—D of Fig. 1; and Fig. 4 is a detail view of a modified form of the means disclosed in Figs. 1 and 2, for preventing the direct current of gas from entering the diaphragm chamber.

Referring more specifically to the drawings and particularly to Fig. 1, the apparatus consists of a casing 1, divided into upper and lower sections as indicated by the reference characters $1^b$ and $1^a$, respectively which are connected to the gas outlet and inlet pipes.

Within the lower section of the casing $1^a$, a hollow body 2, open above, is arranged, the distance between the front and rear walls thereof being less than the distance between the side walls, so that between the front and rear walls of the hollow body or receptacle 2, and the corresponding walls of the casing, there is a hollow space to permit the passage of the unregulated gas. The hollow body 2 is provided at the front part of its base with a projection 3, which serves, on the one hand to form a hollow space between the base of the hollow body and casing for the admittance of gas, and on the other hand to divert the current of gas.

Through the bottom of the hollow body a passageway 4 is formed which is closed by means of a flap valve 5, this valve normally closing the passageway 4, until the water, collected in receptacle 2, reaches a predetermined point, that is until the pressure of the water against the inner face of the valve 5 overcomes the strength of the valve and the gas pressure on the outer face thereof.

Above the hollow body 2 and in abutment therewith, as will be explained hereafter, a circular partition 6 is arranged, which has, on diametrically opposite sides, a pair of slots 7, which are in communication with the passages formed for the unregulated gases between the front and rear walls of the body 2, and the lower section of the casing $1^a$, while on the other two diametrically opposite sides, slots 8 are formed which establish communication between the space within the hollow body 2 and the upper section $1^b$ of the casing 1. Above the partition 6, there is arranged a member 9 terminating in an inwardly extending flange which forms a valve seat for the conical valve 14. As is, of course, understood, the partition 6 is hollow so as to receive the valve stem and valves and permit movement thereof. The inner face of this partition is formed with valve seats 11, 12 and 13 to receive the valves 14, 15 and 16 respectively.

The valves 14 and 16 which are secured to the valve rod 19 are differently formed, for example the valve 14 is formed as a conical valve and valve 16 as a disk valve, whereby when the valve sinks the pressure on the lower valve is greater, because with the upper conical valve the only pressure resisting surface to be taken into consideration is the conical section perpendicular to the axis always at that point where the perpendicular line drawn from the valve seat to the valve cone strikes the latter. By this means a very sensitive deflection of the valve is attained when the gas consumption gets greater. On the valve rod 19 between valves 14 and 16, another disk valve 15 is fixed which, on the diaphragm tearing almost stops up the seat 12. This valve also promotes the distribution of the unregulated gas current entering the body of the valve. The valves are mounted on a common valve spindle 19, which is provided with joints 20 and 21. Both slots 7, heretofore mentioned, of the partition 6 serve to admit the gas from the inlet pipe, so that it can pass upwardly through the valves 14 into the upper part of the casing or downward through the valve 16 into the hollow body 2. The hollow body 2 is pressed against the partition 6 by means of a screw bolt 17 inclosed in a cap 18. Both slots 8 of the partition 6 are situated above and in communication with the interior space of the hollow body 2, so that the gas can escape upward through the same. The top of the upper half of the frame $1^b$ is fitted with a depending tubular prolongation 22, having a bore 23 through which the valve spindle 19 is inserted in a pendulum like manner. The outer edge of the diaphragm is pulled over the upwardly projecting circular rim 24. In the middle of the diaphragm the valve spindle 19 is secured by means of nuts 26 and 27. A protecting cover 28 is placed over the diaphragm. The upper portion of the valve 14 has an upwardly extending flange 30 which forms an annular space 34. In the latter lies a wick 35 which is conducted to the outside through a bore in the valve. This wick carries any glycerin which may have dropped from the diaphragm, out of the ring space.

As heretofore stated, it is desirable that the diaphragm be protected as much as possible from the energy of the flowing gas, so that substantially only the static pressure of the gas will act thereon. The diaphragm may be protected in various ways, as for example, by the depending prolongation 22 of the casing $1^b$, which extends into the annular space 34 in the valve 14, see Fig. 1, and which prevents the direct current of gas from entering into the diaphragm chamber through the bore 23. The same result can be obtained by means of an annular projection 31, formed on the valve rod spindle 19 directly below the opening or bore 23, as shown in Fig. 4.

The operation of the device is as follows:—The gas flows into the inner valve space of the partition 6 through the inlet pipe with unregulated pressure. Should no consumption of gas take place, the pressure above and below the valves 14 and 16 is the same, the diaphragm is pressed up by the increased gas pressure within the diaphragm chamber and the valves 14 and 16 are closed. As soon as any consumption of gas takes place, the pressure existing in the diaphragm chamber falls and thus permits the lowering of the diaphragm together with the valves 14 and 16, which are connected to the diaphragm. When the consumption of the gas diminishes the pressure on the diaphragm is increased, whereby the valves are proportionately raised. Should the diaphragm become leaky or broken the valve spindle falls whereby the valve 14 falls into its seat and closes, and the valve 15 leaves only a small space between the valve and its seat 12, so that the amount of gas passing into the outlet pipe and thence to the lighting system, will be materially decreased, thus giving indication that the diaphragm for some reason is not in good working order. The condensation water, if there be any, flows away through the slots 8 of the partition 6 into the hollow body 2 and thence to the gas-meter. Should very much

precipitation water come suddenly so that the inflow is greater than the outflow, which can only occur under specially unfavorable circumstances, the water will rise in the hollow body 2 till the valve 16 is finally immersed and in consequence of the loss of weight, will be pushed up higher. Also in this case the disarrangement is shown by the lights burning lower. The regulator therefore indicates automatically every irregularity without occasioning a complete shutting off of gas, which might cause an accident.

I claim,

1. In a device for regulating gas pressures, the combination with a gas main, of a partition provided with valve means, and a receptacle adapted to catch the water of condensation which gathers on and drips from said partition, said receptacle provided with an outlet, and valve means normally closing said outlet, but constructed to open when the water in said receptacle attains a predetermined point.

2. In a fluid pressure regulator, a partition, valve means positioned therein, an independent hollow body located below said partition, a flange secured to said body and projecting into the path of the fluid, whereby the direct current of fluid will be diverted and prevented from coming in contact with the said valve means.

3. In a device for regulating gas pressures, the combination with a gas main, of a partition provided with valve means, a hollow body located below said partition and in abutment therewith to receive and hold the water of condensation which drips from said partition, and adjusting means engaging said hollow body whereby the partition and hollow body will be held in operative position.

4. In a device for regulating gas pressures, the combination with a gas main, of a partition provided with valve means, a hollow body located below said partition and in abutment therewith to receive and hold the water of condensation which drips from said partition, and means engaging said hollow body comprising an adjustable bolt journaled in the gas main, the inner end of said bolt adapted to engage the said hollow body, whereby it will be held in adjusted position.

5. In a device for regulating gas pressures, the combination with a gas main, of a partition provided with valve means, a hollow body located below said partition and in abutment therewith to receive and hold the water of condensation which drips from said partition, means engaging said hollow body, the outer end of said means projecting through the wall of the gas main, and a cover to inclose outwardly extending portion of said means, and thereby protect said means from accidental adjustment.

In testimony whereof I have signed this specification in the presence of two witnesses.

Hamburg, this 16th day of January 1909.

MAX JASPERSEN.

Signed in the presence of—
ERNEST H. L. MUMMENHOFF,
OTTO W. HELLMRICH.