(No Model.) 2 Sheets—Sheet 1.

D. WILSON.

GAS PRESSURE REGULATOR.

No. 499,489. Patented June 13, 1893.

Fig. 1.

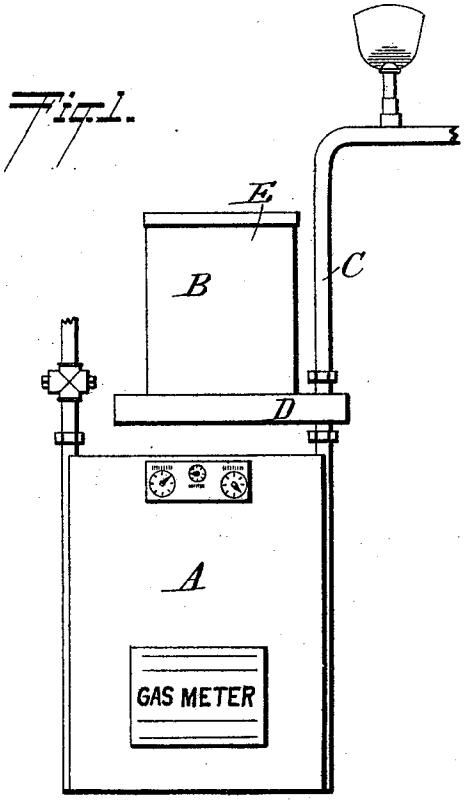
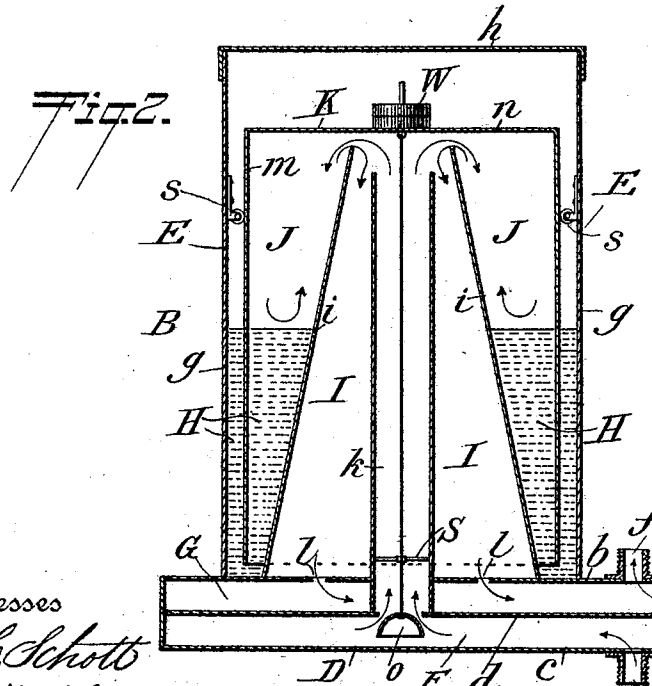


Fig. 2.



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 3.

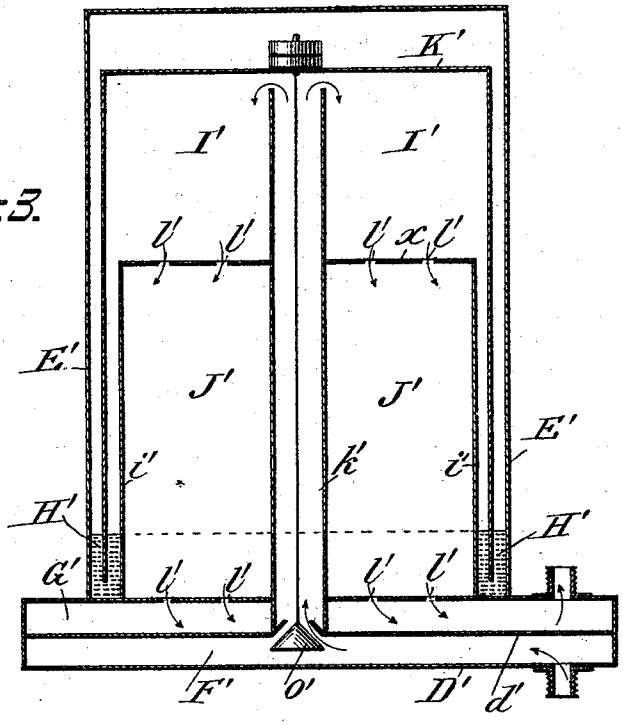
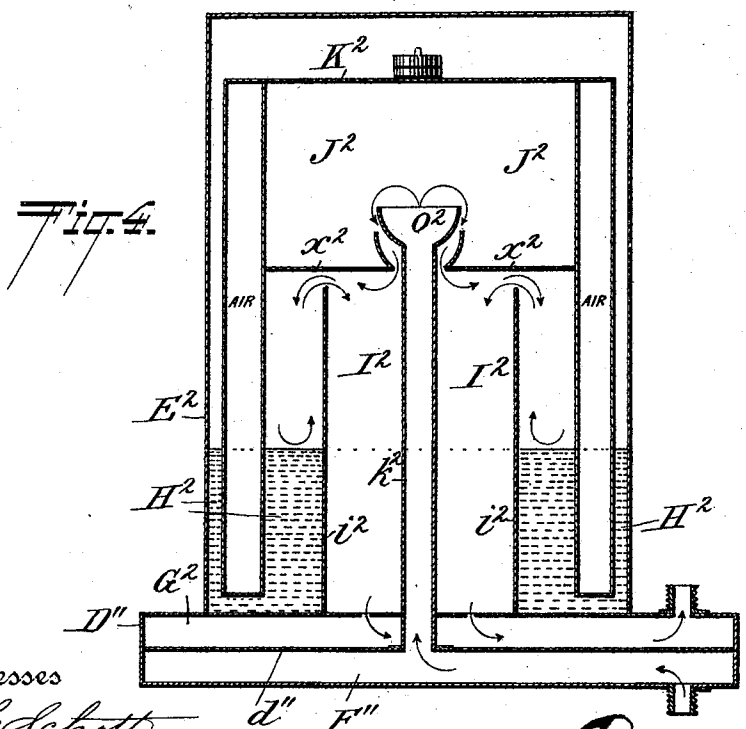


Fig. 4.



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UNITED STATES PATENT OFFICE.

DARIUS WILSON, OF BOSTON, MASSACHUSETTS.

GAS-PRESSURE REGULATOR.

SPECIFICATION forming part of Letters Patent No. 499,489, dated June 13, 1893.

Application filed February 15, 1893. Serial No. 462,478. (No model.)

To all whom it may concern:

Be it known that I, DARIUS WILSON, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Gas-Pressure Regulators, of which the following is a full, clear, and exact description, such as will enable those skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

This invention relates to improvements in gas pressure regulators which are placed intermediate of the supply main and the distributing pipes of a house, &c.

It has for its object the provision of such a device as will automatically control the supply of gas and which will allow it to expand so that it will enter the distributing pipes at a comparatively low pressure, whereby a more perfect combustion will be secured and a consequent saving. Ordinarily the gas enters the distributing pipes directly from the supply main and leaves the burners under a pressure which is the same and varies with that of the supply main. Often the pressure in the main is too great to allow a complete combustion, some of the gas being forced through the flame and allowed to escape, and the pressure fluctuates to such an extent as to give a very unsteady light.

It is the object of the present invention to overcome these objections by feeding the gas to the burners at such a low and constant pressure and in such a volume as to insure a complete combustion and a steady and regular flame.

It also has for its object the provision of such a device as will be of a cheap and simple construction and at the same time efficient in its purpose.

The invention consists essentially of a base and a casing fixed thereon, both of which are divided by partitions into a series of expansion chambers and a fluid chamber in the latter, the first of the expansion chambers being connected with an inlet pipe and the last with an outlet pipe and all of the series being successively connected, the opening of the first into the second being controlled by an automatically operated valve, a float placed in the fluid chamber the buoyancy of which varies as the pressure of the gas in the expansion chambers being the means for operating the valve.

It also consists of the novel construction, combination and arrangement of parts such as will be hereinafter more fully described, pointed out in the appended claims and illustrated in the accompanying drawings.

In the accompanying drawings, in which similar letters of reference designate corresponding parts, Figure 1 is a front elevation of the device showing it connected with a meter and a supply pipe, being placed intermediate of the same. Fig. 2 is a transverse vertical section of a regulator embodying the invention, the valve being shown in an opened position, and the course taken by the gas indicated by arrows. Fig. 3 is a similar view of a modification in which a slight difference in the arrangement of the partitions is shown. Fig. 4 is also a similar view of a second modification showing another arrangement of partitions and also a differently constructed valve.

Referring to the drawings by letter, A designates the meter, B the regulator and C the supply pipe leading to the burners, the regulator being placed intermediate of the meter and the supply pipe.

The construction of the meter and supply pipe form no part of the invention but are shown in conjunction with the regulator to illustrate the preferable arrangement of the same relatively to each other.

The regulator consists of the base portion D and the casing E fixed thereon. The base portion consists of the cylindrical wall *a* of but comparatively little height and of the top and bottom plates *b* and *c*, respectively. It is divided by the horizontal partition *d* into two expansion chambers, the lower of which, F, connects with the inlet pipe *e* and the upper, G, with the outlet pipe *f*. In the present instance the inlet pipe *e* is shown as connecting the chamber into which it empties with the meter A and the outlet pipe *f* connecting the chamber from which it leads with the supply pipe leading to the burners.

The casing E consists of the cylindrical wall *g* of much greater height and of a somewhat shorter diameter than the base and is placed eccentrically on the latter, away from the in-

let and outlet pipes to give more room to the said pipes than would be given if the relative positions were concentric. A plate *h* forms the top of the casing and is removably secured thereon so that access to the interior of the machine can be had for purposes of inspection, cleaning, &c.

Within the casing and concentric with the same the partition *i* is placed. It has a form substantially the same as the frustum of a cone. It can be cylindrical however, but the conical form is the preferable one. This partition divides the casing into the fluid chamber H and the expansion chamber I, the former chamber being inclosed between the said partition and the wall of the casing and the latter chamber by the partition itself. In the fluid chamber glycerine is placed. The space J above the glycerine is to be considered as being an expansion chamber also. The expansion chambers thus formed connect with each other and are connected with the inlet chamber of the base by the pipe *k* and the chamber I connects with the outlet chamber through the openings *l*, *l*, in the plate *b*.

Within the fluid chamber H is placed the float K. It consists of a cylindrical wall *m* having a diameter less than the wall *g* of the casing and of a top plate *n*. The float incloses the two upper expansion chambers for a purpose which will be explained hereinafter. It automatically operates to open or close the valve which controls the opening leading from the inlet chamber of the base and the pipe *k*. The male portion *o* of the valve is of a hemispherical shape supported within the chamber F by the wire *p*, which connects it with the float by passing upward through the pipe *k*. The valve seat is formed in the partition *b*. The wire passes through a spider S near the valve so that a proper register of the latter will be secured.

The float is guided and held in its proper position by the rollers *s*, *s*, attached to the wall of the casing. Instead of these rollers ball bearings may be used. At times, when the pressure upon the glycerine inside of the float is great enough it will rise to a sufficient height to cover the rolls and thereby lubricate the same. The proper adjustment of the float as to its buoyancy is secured by the weights W, W.

It is to be observed that the aggregate size of the openings connecting the chambers I and G is smaller than that of the opening leading from the chamber F into the chambers I and J. The purpose of this will be explained farther on.

The operation of the device is as follows: Assuming the necessary connections to have been made and the float in its normal position, that is depressed so that the valve governing the opening leading from the chamber F will be open, the gas passes from the chamber F into which it enters from the supply pipe *e* through the pipe *k* into the chambers I and J. In these latter chambers the gas collects and when the pressure becomes great enough, by pressing upon the glycerine and thereby increasing the buoyancy of the float, the latter will rise and close the valve and consequently stop the flow of gas. The quickness with which the float acts depends upon the extent to which it has been weighted. The gas which has passed into the chambers I and J will expand therein and pass through the openings *l*, *l*, into the chamber G, from which it passes to the pipe supplying the burners. The gas in its passage through the machine enters several large expanding chambers, namely the compartments F, I, J and G. In its passage through these chambers the gas becomes thoroughly expanded and enters the supply pipe at a comparatively low and regular pressure. Owing to the aggregate size of the openings *l*, *l*, being much smaller than that of the opening leading from the chamber F the gas in the chamber G will be under much less pressure than that in the preceding chambers and therefore will be more thoroughly expanded. By this means a uniform supply of gas to the burners at a comparatively low pressure is secured, which will insure an almost perfect combustion and consequently an economical usage.

In the modification shown in Fig. 3, D′ is the base and E′ is the casing. The construction is substantially the same as that shown in Fig. 2, only differing somewhat in the number and arrangement of the dividing partitions. The base is divided by the partition *d′* into inlet and outlet chambers F′ and G′ respectively. The casing E′ is divided by the vertical cylindrical partition *i′* and the horizontal partition *x* into the expansion chambers I′ and J′ and the fluid chamber H′. In the fluid chamber the float K′ is placed and is connected with and operates the valve *o′* which controls the opening leading from the chamber F′ into the pipe *k′* which connects with the chamber I′. The operation of the float in this instance is the same as in the preceding one. The openings *l′*, *l′*, in the partitions *x* and *b′* are successively smaller as compared with each other and with the opening leading into the chamber I′. The gas in its passage through a machine of this construction will have a chance to more thoroughly expand than it would have in the one first described.

The modification shown in Fig. 4 shows a slight difference in the arrangement of the partitions, the construction of the float and valve and in the operation of the latter. It consists of the base D^2 divided by the partition d^2 into inlet and outlet chambers F^2 and G^2 respectively and of the casing E^2 divided by the vertical cylindrical partition i^2 into the expansion chamber I^2 and the fluid chamber H^2. The expansion chambers of the base and the casing successively open into each other. In the fluid chamber is placed the float K^2. The latter has in its upper part the expansion chamber J^2 formed by the parti-

tion x^2. This chamber is connected with the chamber F^2 by the pipe k^2. In this instance the male portion o^2 of the valve is held stationary by the pipe k^2 and the female portion is supported by the partition x^2. The valve in this instance is operated by the pressure of the gas upon the fluid which increases the buoyancy of the float, which is weighted so as normally to be in a depressed position, so that it will rise and bring the two parts of the valve together and thereby cut off the flow of gas into the machine. When the gas in the chambers I^2 and H^2 ceases to exert the pressure necessary to cause the float to rise by reason of the outflowing of the same the valve is opened again. In this instance it is necessary to so weight the float as to overcome any tendency of the same to remain in a raised position by reason of the force exerted by the pressure of the main upon the top plate of the float being greater than on the plate x^2. In a general way, however, the operation in this instance is the same as in the two previous ones.

While I consider the constructions above described and illustrated in the drawings as being the best embodiments of my invention, still I am aware that the same may be modified without departing from the spirit of the invention. I do not therefore desire to be limited to the specified constructions and arrangements set forth.

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

1. In a gas pressure regulator, the combination of the base divided by a partition into an inlet and an outlet chamber, the casing secured thereon, the partition dividing the casing into expansion chambers and a fluid chamber, the said expansion chambers connecting with each other and with the inlet and outlet chambers successively, the opening leading into each chamber being larger in size than the opening leading from the same, the valve controlling the opening leading from the inlet chamber to the expansion chambers, and the float placed in the said fluid chamber and connected with the said valve, substantially as described.

2. In a gas pressure regulator, the combination of the base divided by a partition into expansion chambers one of which is connected with the inlet pipe and the other with the outlet pipe, the casing attached to the said base and divided by a vertical cylindrical partition into an expansion chamber and a fluid chamber, the float placed in the fluid chamber and divided by a horizontal partition into expansion chambers opening into each other the lower of the said chambers connecting with the outlet chamber of the base, the pipe connecting the upper chamber of the float with the inlet chamber of the base, and the automatically operated valve controlling the opening connecting the chambers of the float, substantially as described.

3. In a gas pressure regulator, the combination of the base divided by a horizontal partition into two expansion chambers, the lower of which connects with the inlet pipe and the upper with the outlet pipe, the cylinder secured to the upper face of the said base, the cylindrical partition placed within the first mentioned cylinder and forming an expansion chamber which is connected with the outlet chamber of the base, the float placed intermediate of the outer and inner cylinders divided into two expansion chambers by a horizontal partition provided with a valve seat, a pipe connecting the lower expansion chamber of the base with the upper expansion chamber of the float having its upper end enlarged to form a valve, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

DARIUS WILSON.

Witnesses:
N. F. MOSHER,
FRED J. PARKS.