G. HALTER.

VALVE.

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1,118,649.

Patented Nov. 24, 1914.

Fig. 1.

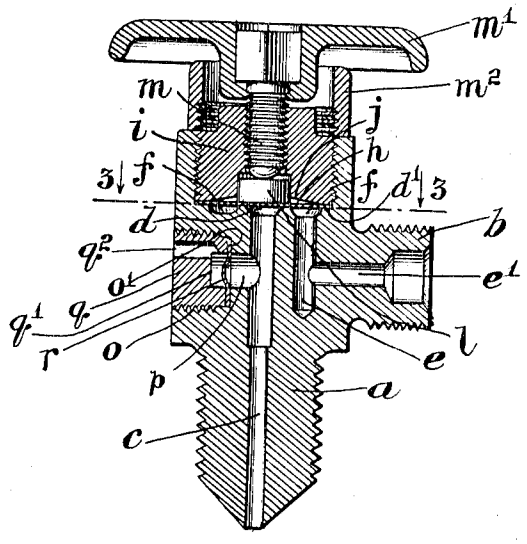


Fig. 2.

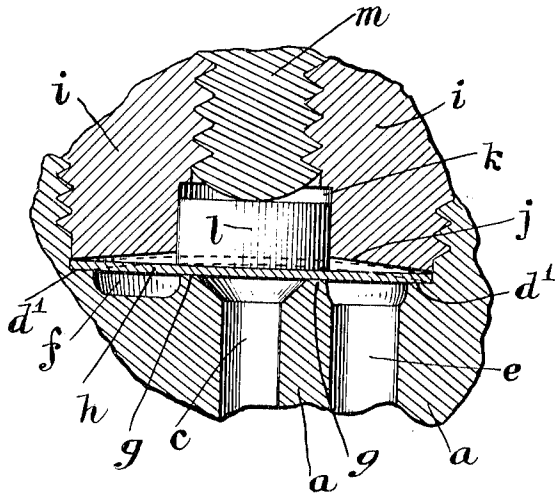


Fig. 4.

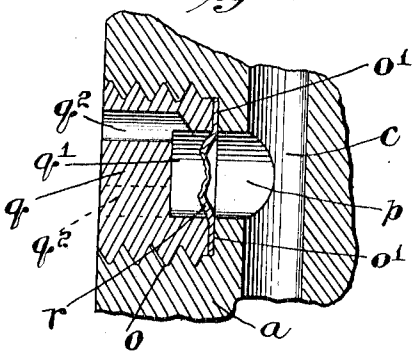
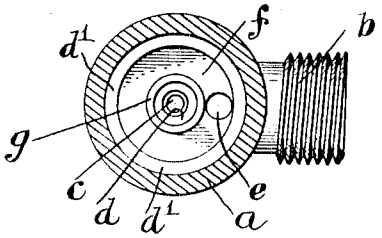


Fig. 3.



Attest:

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UNITED STATES PATENT OFFICE.

GEORGES HALTER, OF NEWARK, NEW JERSEY, ASSIGNOR TO INTERNATIONAL OXYGEN COMPANY, A CORPORATION OF NEW JERSEY.

VALVE.

1,118,649. Specification of Letters Patent. Patented Nov. 24, 1914.

Application filed February 9, 1912. Serial No. 676,555.

To all whom it may concern:

Be it known that I, GEORGES HALTER, a citizen of the Republic of France, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Valves, of which the following is a specification, reference being had therein to the accompanying drawings, which form a part thereof.

My invention relates to valves, and more particularly to a type of high pressure gas valves.

The main object of the invention is to provide a gate controlling the main lead from the tank or other source of supply, which will seat sufficiently tightly with small movement, to insure the holding of high pressure gas, and will also sufficiently open with a small quantity of movement, to permit the control of the flow of gas.

A still further object is to provide a high pressure gas valve wherein the gate will be so packed, whether the valve be opened or closed, as to avoid any likelihood of leakage about the gate or the valve stem.

A still further object is to provide a valve wherein the gate is under the control of the valve stem, but when released by the action of said stem will be opened by the pressure within the tank or other source of supply.

A still further object is to provide a high pressure gas valve having a lead communicating with the tank, or other source of supply, and an independent lead in communication with a supply pipe, said last named lead being constantly in communication with a chamber into which said first named lead discharges when open, and said first named lead being controlled by a valve gate, means being provided whereby when the gate is opened, the gas will flow in small volume through a relatively large vented area, so as to secure a sufficiently great volume of gas with a comparatively small movement of the gate.

A still further object is to provide a valve of the character above referred to, utilizing a flexible diaphragm gate, closing the outlet of the tank lead, and a rigid valve stem of a size to extend over the entire outlet of said lead, and when the gate is closed, to hold it perfectly flat and rigid above and about the outlet of said lead.

A still further object is to provide a valve using a diaphragm gate wherein the stem will be so constructed as to avoid any torsional strain on the diaphragm, and furthermore as to minimize friction between the diaphragm and the stem to a degree to permit the stem to be easily rotated.

A still further object is to provide a valve embodying a diaphragm gate, wherein the gate will be closed by a direct lineal thrust of the stem and will be opened by the gas pressure as a result of a similar movement of the stem in the opposite direction.

A still further object is to provide a valve, the parts of which will be so constructed and arranged as to permit a blow-off to be seated within and protected by the body of the valve casing in a manner to avoid any likelihood of its being accidentally broken at the point of connection with the casing in a manner which frequently occurs with protruding blow-off valves. And a still further object is to provide a valve which will be simple in design, and the gate of which will seat properly without requiring an unusually fine finish.

The invention consists primarily in a gas valve, embodying therein a casing having therein one lead adapted to be placed in communication with a tank or other source of supply, a second lead adapted to be placed in communication with a supply pipe, or other source of consumption, and a chamber common to both said leads, a diaphragm gate seated in said chamber and adapted to close said first named lead, and a stem adapted to bear upon and close said diaphragm gate, and recede therefrom to permit it to open under gas pressure in said first named lead; and in such other novel features of construction and combination of parts as are hereinafter set forth and described, and more particularly pointed out in the claims hereto appended.

Referring to the drawings:—Figure 1 is a longitudinal section of a valve embodying my invention; Fig. 2 is a detail sectional view, on an enlarged scale, of the diaphragm gate and the adjoining parts of the valve stem, the operation of the diaphragm being indicated in dotted lines; Fig. 3 is a transverse section on the line 3—3 of Fig. 1; and Fig. 4 is a detail sectional view, on an enlarged scale, of the blow off mechanism.

Like letters refer to like parts throughout the several views.

In the embodiment of my invention shown in the drawings, *a* indicates the valve casing and *b* the nipple by means of which the supply pipe may be connected to said casing. One end of the casing is exteriorly screw threaded to facilitate its attachment to a gas tank or other source of supply from which gas under high pressure is drawn through the valve. Extending longitudinally of the casing *a* is a lead or bore *c* the inlet end of which opens into the tank or other source of supply and the outlet end of which opens into a chamber *d* formed in said casing. The said bore is of small diameter toward the bottom thereof and of increased diameter toward the top thereof, the discharge end of the said bore being outwardly flared as shown to form a narrow seat which will be hereinafter referred to and also give direction to the gas when the valve is opened. Parallel with the lead *c* is a second, or outlet, lead *e*, discharging through the lead *e'* in the nipple *b*, said lead *e'* extending at right angles to the lead *e* at a point thereof to form a trap below the point of connection between these outlet leads. The chamber *d* is common to both leads *c* and *e*, and with the channel *f* forming a part of said chamber, constitutes the channel through which the gas passes from one to the other.

Extending concentrically about the outlet end of the lead *c* in the bottom of the chamber *d*, is a groove or channel *f* which channel is in direct communication with the lead *e* and forms a circular raised valve seat *g* above which the gas is adapted to flow from the lead *c* to said groove or channel *f* and thence to the lead *e*. Said channel or groove also forms a shoulder *d'* upon which the diaphragm gate is adapted to be clamped to pack the edge thereof against the escape of gas from said chamber, and channel.

Seated within the chamber *d* and upon the shoulder *d'* is a flexible, disk-shaped, metallic diaphragm gate *h*, which is made of stock of a sufficient gage to withstand the gas pressure. The edge of said diaphragm is clamped firmly upon the shoulder *d'* by a screw plug *i* mounted in screw threads in the wall of the chamber *d*. The inner face of the plug *i* is concave at *j*, (See Fig. 2) and has centrally thereof, and directly above the outlet end of the lead *c* a recess *k* adapted to receive a reciprocatory stem block *l*, having a flat face and of a diameter adapted to force the diaphragm gate *h* upon the valve seat *g* and hold that portion thereof extending across the outlet end of the lead *c* perfectly flat and rigid, thus avoiding any such spring of the diaphragm within the seat *g* when the valve is closed as would result in leakage of the gas. I make the bottom of said plug concave to admit of the diaphragm being sprung away from the seat *g* by the gas pressure when said block is permitted to move away from said seat, while at the same time limiting the maximum movement of said diaphragm gate. The longitudinal dimension of the recess *k* is sufficient to permit the stem block *l* to have movement therein from the seat *g* to the desired maximum extent.

Mounted in the plug *i* in axial alinement with the block *l* is an adjustable pintle stem *m* which preferably is screw threaded so as to have movement with the requisite power toward the seat *g* and away therefrom to accomplish, or permit the reciprocation of said block *l* to close or open the valve. While the movement of said block *l* is accomplished through the rotative movement of said screw threaded stem *m*, it will be observed that neither it nor the diaphragm is subjected to any twisting action or torsional strains from said stem. The stem *m* carries, and is actuated by means of, an operating handle *m'*. A lock ring m^2 serves to prevent the accidental loosening of the plug *i* and a loss of the packing about the edge of the diaphragm gate *h*.

The use of a bi-part stem, one part of which has a rotary movement and is advanced and retracted by a screw, and the other part of which is under the control of the first named part, and has a reciprocatory movement only in actuating a diaphragm gate, gives great reliability to the action of the gate and, as has been demonstrated, permits it to be set tight enough to prevent the escape of gases reaching a pressure of two thousand pounds or more to the square inch. Furthermore, it eliminates any substantial wear upon the diaphragm and distributes the closing pressure over an area sufficient to insure a parallel movement of the diaphragm about that portion thereof which seats upon the circular, narrow valve seat *g*.

In one side of the casing *a*, is a recess *o* having interior screw threads, and leading therefrom and opening into the lead *c* is a lead *p*. About the end thereof discharging into the recess *o* a seat *o'* is formed, and clamped upon said seat by a screw plug *q* and extending across the lead *p*, is a thin, gas proof disk *r* of a tensile strength sufficient to resist and withstand a predetermined maximum pressure. The plug *q* has a chamber *q'* therein of a diameter approximately the same as that of the lead *p* whereby a packing ring opposed to the seat *o'*, and leading from said chamber adjacent the sides thereof through said plug to atmosphere, is one or more vent openings q^2.

The operation of the herein described valve is substantially as follows:—A valve of this character is especially adapted for use in connection with tanks containing oxygen or hydrogen under a pressure up to two thousand pounds or more to the square inch,

such tanks being extensively used in connection with the cutting and welding of metal by means of said gases. In using the gas from such tanks, it is essential that the flow be under absolute control, and all leakage should, in the interests of economy be avoided. When gas is not being drawn from the tank, the screw threaded stem *m* is set down hard, forcing the block *l* with a reciprocatory movement, and with it the diaphragm gate *h*, toward the seat *g*. When the gate *h* has been set upon said seat, the stem *m* will, through the block *l* exert sufficient pressure upon the seat *g* through said diaphragm to form a gas tight joint. The flat face of said stem block engaging said diaphragm, will avoid any reflex action thereof which would tend toward a loss of this joint. If it be desired to use gas from the tank, the screw threaded portion *m* of the valve stem may be raised, freeing the block *l* which will be raised by the gas pressure in the lead *c* and the tank, not shown, to the extent afforded by the movement of the part *m*, or by the depth of the recess *k*. The concaved face *j* of the plug *i* will permit the diaphragm gate *h* to flex away from the seat *g*, thus permitting the gas to pass at all points about the outlet end of the lead *c* through the chamber *d* about the said seat *g* to the channel *f*, in a thin layer, the entire volume of gas ultimately flowing through said channel or groove *f* to the lead *e*. During the flow of gas, the plug *i* bearing upon the edge of the diaphragm gate *h* prevents any gas from escaping about said plug, and the diaphragm itself forms a gas tight barrier excluding gas from the bipart stem *l m*. If at any time, from any cause, there be a sudden rise of pressure in the tank, the blow off disk *r* will break down, allowing the gas to escape through the recess *q'* and vent openings q^2. This blow-off mechanism, being contained entirely within the outside dimension of the casing *a* is protected from all of the conditions of use which would tend to subject it to breakage away from the main casing, which conditions are common in connection with the character of work in which apparatus of this character are used.

It is not my intention to limit the invention to the precise details of construction shown in the accompanying drawings, it being apparent that such are merely matters of design and may be varied without departing from the spirit and scope of the invention.

Having described my invention, what I claim as new and desire to have protected by Letters Patent, is:—

1. A gas valve embodying therein a casing having a lead extending vertically therethrough and communicating with a source of gas supply, the inlet end of said lead being of smaller diameter than the outlet end, the outlet end being outwardly flared; a second lead parallel with said first named lead adapted to be placed in communication with a source of consumption, and an annular channel surrounding said first named lead and in communication with said other lead whereby a reduced annular valve seat is formed about said first named lead, and a shoulder is formed encircling said channel, said shoulder occupying the same plane as said valve seat, a flexible metallic diaphragm, the edge of which seats upon said shoulder and the central portion of which seats upon said valve seat, a plug secured to said casing and adapted to clamp the edge of said diaphragm upon said shoulder, the lower face of said plug being concaved and having a recess centrally thereof, of reciprocatory plug having a plane lower surface seated in said recess, an adjustable pintle stem in axial alinement with said plug and operating means for said stem.

2. A gas valve, embodying therein a casing having a lead therein adapted to be placed in communication with a tank or other source of supply, and a blow off mechanism consisting of a removable plug seated in and entirely contained within a recess in said casing and flush with the outer face thereof, said plug having an interior chamber forming a packing ring and a plurality of outlet ducts leading from said chamber through said plug, adjacent the edge of said interior chamber, said casing having a lead extending from said first named lead to said recess in said casing, and a fragile diaphragm held in said recess by said plug and across said lead.

In witness whereof, I have hereunto affixed my signature, in the presence of two subscribing witnesses, this 6th day of February, 1912.

GEORGES HALTER.

Witnesses:
WALDO M. CHAPIN,
ISAAC H. LEVIN.