(No Model.)

J. OLSON.

FLUID PRESSURE REGULATOR.

No. 530,200. Patented Dec. 4, 1894.

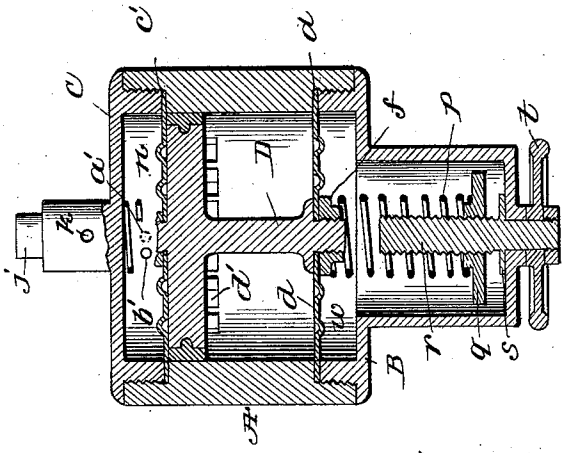

Fig. 2.

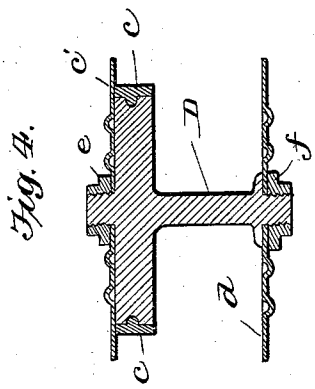

Fig. 4.

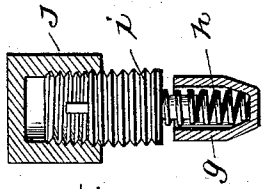

Fig. 5.

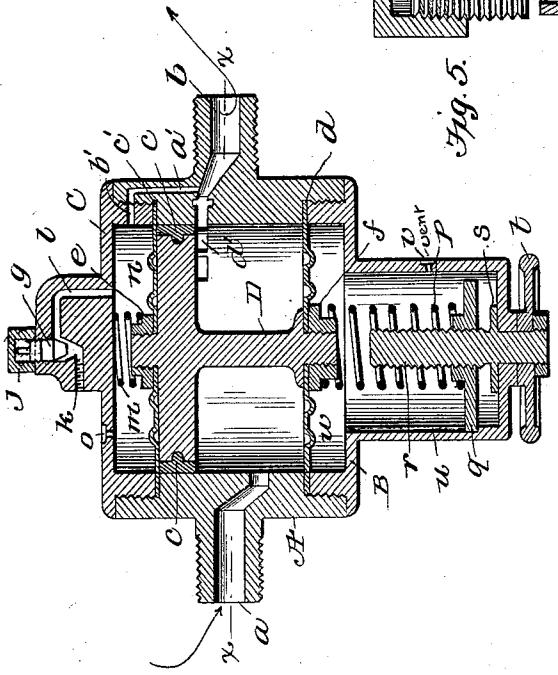

Fig. 1.

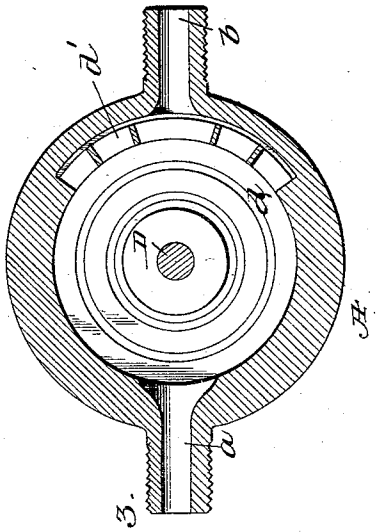

Fig. 3.

Witnesses

Jno. Devine

Josh. Stack.

Inventor

John Olson

UNITED STATES PATENT OFFICE.

JOHN OLSON, OF TWO HARBORS, MINNESOTA.

FLUID-PRESSURE REGULATOR.

SPECIFICATION forming part of Letters Patent No. 530,200, dated December 4, 1894.

Application filed March 17, 1894. Serial No. 504,005. (No model.)

To all whom it may concern:

Be it known that I, JOHN OLSON, a citizen of the United States, residing at Two Harbors, in the county of Lake and State of Minnesota, have invented certain new and useful Improvements in Fluid-Pressure-Regulating Valves; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

My invention relates to those automatic valves which are used for regulating or reducing the pressure of fluids delivered through them, as will be fully described and set forth in the accompanying drawings, specification and claims.

The object of the invention is to provide a valve which shall be at once simple, sensitive, and reliable.

To this end it consists in the combination of a piston with packing ring, and diaphragms in the peculiar form and manner hereinafter described and claimed.

In the accompanying drawings—Figure 1 is a vertical axial section through a regulator constructed on my plan. Fig. 2, is a similar view taken at right angles to Fig. 1. Fig. 3 is a cross section taken on lines *x*—*x* of Fig. 1. Fig. 4 is a sectional view of piston with diaphragms attached. Fig. 5 is a detail view of pop valve in cap C.

Referring to the drawings—A represents the valve-body, having the inlet passage *a*, and outlet passage *b*, with caps B and C, screwed into said valve-body A.

D is a vertically moving valve made in shape of a piston with packing ring *c*, made in that peculiar form as shown, and mounted on and between two diaphragms *c'* and *d*, said diaphragms being made fast to piston D, by nuts *e* and *f*, and mounted between the valve-body A, and caps B and C; thus also forming a joint between the initial of valve-body A, and chambers *w* and *n* in caps B and C. It will be noticed, packing-ring *c*, is made with an annular rib at its inner side, and piston head D having an angular groove wherein said rib is placed. Thus the packing ring may cover the whole periphery of the piston-head and project out to the edges of the same, and still keep its place. The cap C has at its end a pop valve *g*; in other words, a valve that will raise at a certain pressure, as may be desired, and held to its seat by spring *h*, mounted in said valve and adjusted by screw *i*, screw-threaded in cap C, and having a cap or check-nut *j*. The fluid pressure will enter through port *k*, and when it exceeds the tension of spring *h*, will then lift valve *g*, from its seat and pass down through passage *l* in chamber *n*, and depress valve D, thus closing communication to passage *b*. If I desire to invert the regulating valve and at the same time wish to have the valve closed when not in use, I have a light spring *m*, placed in chamber *n*, between cap C and diaphragm *c'*, having a tension equal to the weight of piston-valve D, and force required for compression of said diaphragm. A small passage *o*, is made in cap C, that the pressure in chamber *n* may escape after valve *g* is closed, thus allowing the diaphragms and piston-valve D, to raise and open the communication through ports *a* and *b*. Cap B has also a spring *p* resting against nut *f* and nut *q*, on stem *r*, said stem having a collar *s*, resting against the inner side of cap B, and on its outer end a handle wheel *t*, to adjust the tension of spring *p*. The nut *q*, is provided with a lug or projecting point. This travels in groove *u* in the inner side of cap B, thus preventing said nut from turning around when the tension of spring *p* is adjusted.

A small port *v* is made at any convenient place in cap B, thus allowing a free ingress and egress of the atmosphere in chambers *w*, as piston valve D and diaphragms *c'* and *d* are moved back and forth by the fluid pressure and the adjusting springs.

A passage *b* as shown in Fig. 3, is composed of a series of small ports *d'*, its object being to leave a small portion of metal to guide packing-ring *c*, as if it were only an open passage or slot, said packing-ring might, at some time, get caught in said slot and thus the free working of the regulator be obstructed. When I desire to use said regulating valve, for what is known as a reducing valve, I have provided a port or passage *a'* leading from passage *b*, through the wall of valve-body A

and communicating with port b' in cap C; thus allowing the pressure in passage b, to accumulate in chamber n. When said pressure exceeds the tension of spring p, it forces the piston valve D down, thus cutting off or obstructing the free passage of pressure through ports a and b. As the pressure in passage b decreases the pressure in chamber n likewise decreases. Thus the tension of spring p, forces the piston valve and diaphragms up and again opens the passage b. When I wish to use the regulator for other purposes and not as a reducing valve, I screw cap C in a little harder, sufficient to close the communication between passage b', and passage a', as shown by dotted lines in Fig. 2, port b' being moved sufficient to close passage a'.

The working of my improved regulator is as follows:—When used in connection with air pumps, I connect passage a with the pipe leading from the boiler pressure on an engine or other receptacle containing pressure, and passage k with a pipe from engineer's brake valve, and in connection with the pressure in what is known as train line pressure, and adjust spring p, sufficient to keep valve D open when pressure in chamber n is removed. As the pressure in pipe leading from train to passage k rises above the required pressure, it forces valve g from its seat, flows down through passage l into chamber n and forces the piston D down, thus cutting off communication between passages a and b. As the pressure under valve g decreases spring h seats said valve and the pressure in chamber n escapes through vent port o, and the tension of spring p, raises piston valve D thus opening the communication as before.

When I desire to use my regulator as a reducing valve, I adjust cap C so passage a' corresponds with passage b'. Thus free communication will be obtained between passage b, and chamber n. As the pressure in chamber b, increases above the tension of spring p, it forces piston D down and cuts off communication through port b. As the pressure in chamber n, decreases spring p forces piston D up and thus opens the communication as before.

I wish it understood that I may dispense with valve g and make connection with passage k, and omit passage o, if I desire without deviating from the principle of my invention.

Having thus described my invention, what I claim is—

1. In a fluid pressure regulating valve, the combination of a chambered casing provided with inlet and outlet ports, the outlet port being composed of a series of small passages, chambered caps screwed into said casing and diaphragms interposed between said casing and caps, a piston operating as a valve to open and close said ports mounted onto and between said diaphragms carrying a packing-ring having an annular rib on its inside; substantially as described and shown.

2. In a fluid pressure regulating valve the combination of a chambered casing provided with inlet and outlet ports, the outlet port being composed of a series of small passages, chambered caps screwed into said casing and diaphragms interposed between said casing and caps, a piston operating as a valve to open and close said ports, mounted onto and between said diaphragms carrying a packing-ring having an annular-rib on its inside, one of the chambered caps being provided with a pop valve and passages leading to and from the same into the chamber between the diaphragm and cap, a spring interposed in said chamber between said cap and diaphragm; the other cap being provided with an adjusting spring interposed between the diaphragm and a nut mounted on an adjusting stem passing through said cap and provided with a handle, said nut having a projecting lug traveling in a groove on the inside of said cap substantially as described and shown.

3. In a fluid pressure regulating valve; the combination of a chambered casing provided with outlet and inlet ports the outlet port being composed of a series of small passages, chambered caps screwed into said casing and diaphragms interposed between said caps and casing, a piston operating as a valve to open and close said ports, mounted onto and between said diaphragms, carrying a packing-ring one of the chambered caps provided with a pop valve and passages leading to and from the same into the chamber between the diaphragm and cap, a spring interposed in said chamber between said cap and diaghragm, the other cap provided with an adjusting-spring interposed between the diaphragm and a nut mounted on an adjusting stem passing through said cap and provided with a handle said nut having a projecting lug traveling in a groove on the inside of said cap, a passage leading from the outlet port in the casing and to a port in the cap provided with the pop valve said passages may be set or adjusted so they will register or not to register as desired, substantially as described and shown.

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

JOHN OLSON.

Witnesses:
LUTHER L. APPLE,
JOHN WELCH.