(No Model.)

G. METZGER.

FLUID PRESSURE REGULATOR.

No. 334,714. Patented Jan. 19, 1886.

Fig. 1.

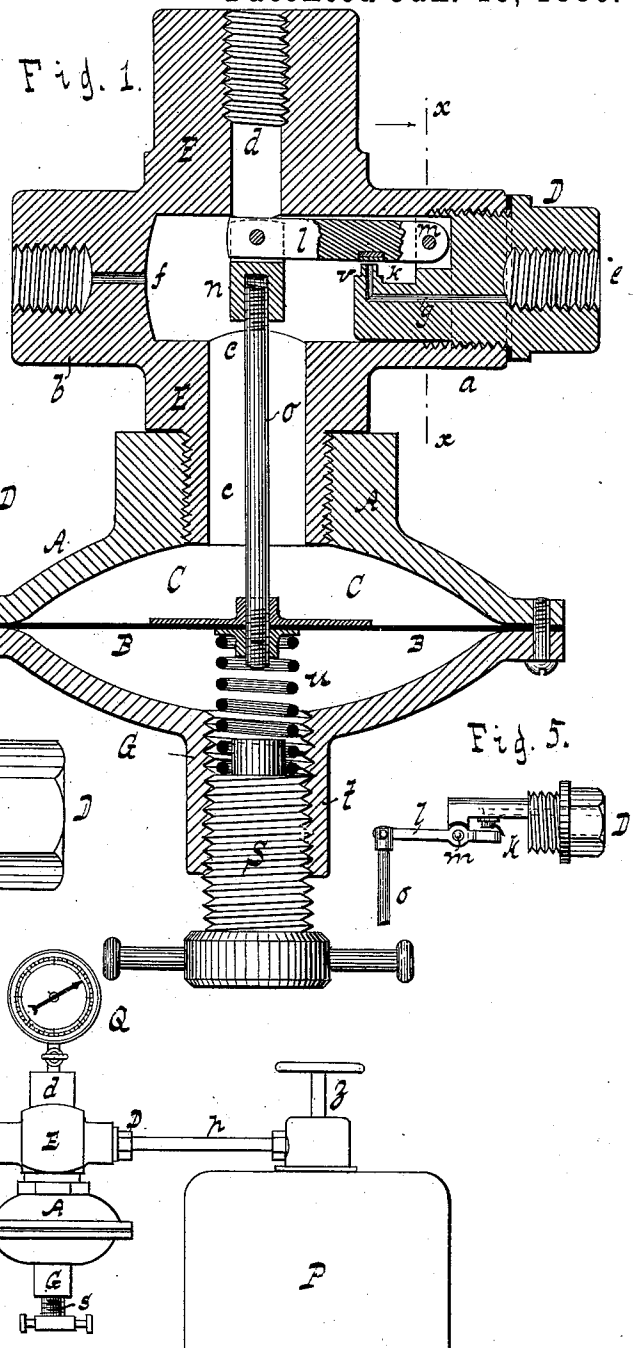


Fig. 2.

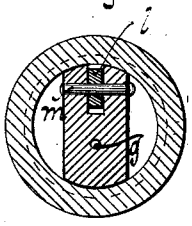


Fig. 4.

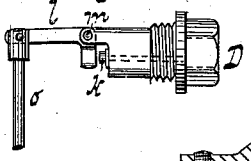


Fig. 3.

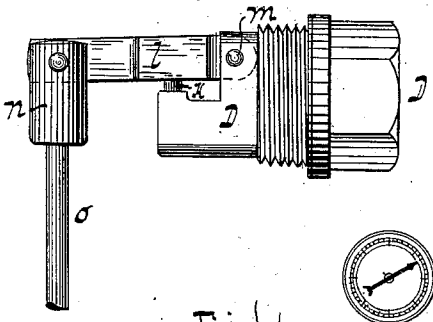


Fig. 5.

Fig. 6.

Witnesses:
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UNITED STATES PATENT OFFICE.

GUSTAV METZGER, OF NEWARK, NEW JERSEY, ASSIGNOR TO JOHN B. STOBAEUS, OF SAME PLACE.

FLUID-PRESSURE REGULATOR.

SPECIFICATION forming part of Letters Patent No. 334,714, dated January 19, 1886.

Application filed November 7, 1885. Serial No. 182,098. (No model.)

To all whom it may concern:

Be it known that I, GUSTAV METZGER, a citizen of the United States, and a resident of Newark, county of Essex, State of New Jersey, have invented new and useful Improvements in Fluid-Pressure Regulators, of which the following is a specification.

My invention relates to improvements in apparatus for reducing pressure, generally called "reducing-valves," and in particular to the class of diaphragm-valves.

The novel features of my improvements are fully pointed out in the following specification, and illustrated in the annexed drawings, in which—

Figure 1 is a vertical section of the apparatus. Fig. 2 is a section on *x x* of Fig. 1. Fig. 3 is a side view of the valve-plug detached. Figs. 4 and 5 show modifications of the valve-plug and valve-lever. Fig. 6 shows the apparatus attached to a carbonic-acid flask.

A represents the casing of the valve; B, a diaphragm, preferably made of thin sheet metal and secured by bolts between the flanges of the casing A and of a shell, G.

C is the low-pressure chamber, formed by the casing A and the diaphragm B.

E is a hollow cross, screwed into or otherwise fastened to the casing A, or forming one piece with the same. One of its hollow arms, *a*, is threaded for the reception of a plug, D, which by its threaded socket *e* is connected with the supply-pipe, (marked *p* in Fig. 6.) The opposite arm, *b*, contains the discharge-channel *f*, and has a threaded channel for attaching a pipe, *g*, leading to the place of use. The hollow arm *c* leads to the low-pressure chamber C, and the hollow arm *d* may be plugged up, or a pressure-gage, Q, attached to it. The valve-plug D has a narrow channel, *g*, leading to the valve-nozzle *k*, the end face of which forms the valve-seat.

As shown in Figs. 1 and 3, the valve-seat faces upward at right angles to the diaphragm; but it may be made to face in opposite direction, as in Fig. 5, or at right angles to this direction, as in Fig. 4.

l is a lever pivoted to the valve-plug D at *m*, and holding the valve-disk *v*, which consists of brass or similar material inserted into a recess in the lever *l*, and coated on the outside by a thin layer of soft metal, preferably tin-solder, whereby the closing of the valve is rendered reliable and effective.

I am aware that soft-metal valve-disks are well known and have been in use prior to my invention for insuring a perfect bearing between the valve and its seat. Small valve-nozzles such as used by me are, however, very apt to become embedded in the soft-metal seats, whereby the degree of deflection of the discharged jet is changed, and consequently also the pressure upon the lever and the adjustment of the instrument. By using a hard-metal seat coated by a very thin layer of soft metal embedding of the nozzle is prevented, while the soft-metal coating insures a perfect bearing.

n is a screw-socket pivoted to the outer end of the lever *l*; *o*, a rod, one end of which is screwed into the socket *n*, while the other end is connected to the diaphragm B, as shown in Fig. 1, both connections being adjustable.

As shown in Figs. 1 and 3, the lever *l* is single-armed; but in the modification shown in Fig. 5 it is a straight double-armed lever, and in Fig. 4 a bell-crank lever.

The shell G has a hollow internally-threaded shank, *t*, within which one end of a spiral spring, *u*, is placed, the other end of which abuts against the diaphragm B. A screw-plug, S, is screwed into the shank *t*, and has a lug which projects into the spiral spring *u*. By the screw-plug S the pressure of the spring upon the diaphragm is regulated. An air-hole may be provided in the shell G.

Fig. 6 shows the apparatus attached to a carbonic-acid flask or other high-pressure vessel, P, by means of a pipe, *p*.

Q is a pressure-gage; *q*, a pipe leading to the place of use, and being provided with a stop-cock, *y*.

In place of the spring *u*, a weighted lever may be used for regulating the pressure upon the diaphragm.

I am aware that diaphragm-valves have long been known, and have been used for regulating pressure, such valves being, for instance, described in British Letters Patent of 1837,

No. 7,447, of 1839, No. 7,939, and in numerous other foreign and American patents.

What I do claim as my invention is—

1. The combination, with the low-pressure chamber C, formed by the casing A and the diaphragm B, of the cross E, the valve-plug D, screwed into the cross E and containing the inlet-channel *g* and valve-nozzle *k*, the lever *l*, pivoted to the plug D, and containing the metallic valve-disk *v*, the rod *o*, adjustably connected to the lever *l'* and to the diaphragm B, an outlet, *f*, and means, substantially as described, for regulating the pressure upon the diaphragm, substantially as and for the purpose set forth.

2. The valve-disk *v*, formed of a hard metal, secured in the valve-lever, and coated with a thin layer of soft metal, in combination with the valve-nozzle *k*, substantially as and for the purpose specified.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 2d day of November, 1885.

GUSTAV METZGER.

Witnesses:
J. B. STOBAEUS,
CHAS. BANDER.