(No Model.)

E. ANDRE.

PRESSURE REGULATING OR REDUCING VALVE.

No. 404,586. Patented June 4, 1889.

Fig. 1.

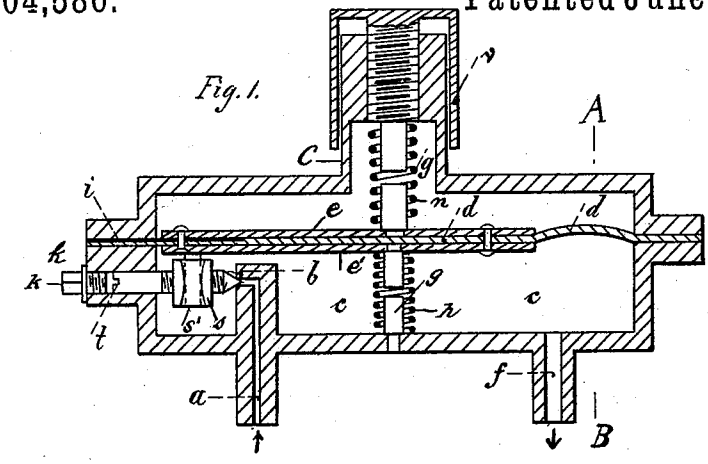


Fig. 2.

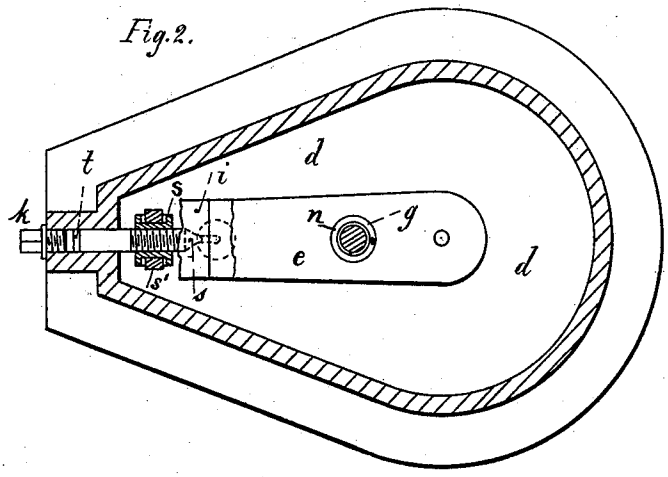
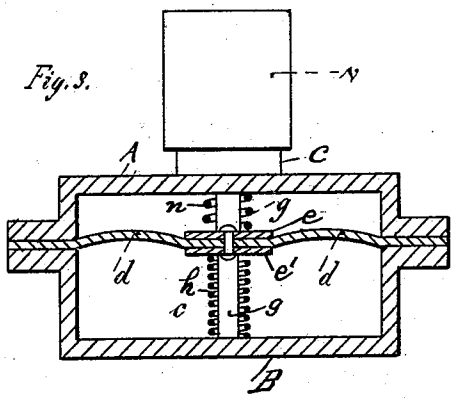


Fig. 3.



Witnesses.
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by
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UNITED STATES PATENT OFFICE.

EMIL ANDRE, OF HANOVER, GERMANY, ASSIGNOR TO FRANZ HEUSER & CO., OF SAME PLACE.

PRESSURE REGULATING OR REDUCING VALVE.

SPECIFICATION forming part of Letters Patent No. 404,586, dated June 4, 1889.

Application filed May 17, 1888. Serial No. 274,180. (No model.) Patented in Germany May 15, 1886, No. 40,647, and March 3, 1887, No. 42,305; in France June 24, 1886, No. 176,992; in Belgium April 26, 1887, No. 77,223; in Austria-Hungary July 22, 1887, No. 8,814 and No. 30,450, and in England December 15, 1887, No. 17,277.

To all whom it may concern:

Be it known that I, EMIL ANDRE, of Hanover, in the Kingdom of Prussia and German Empire, have invented a new and useful Improvement in Pressure Regulating or Reducing Valves, (for which I have obtained Letters Patent in Germany, No. 40,647, dated May 15, 1886, and No. 42,305, dated March 3, 1887; France, No. 176,992, dated June 24, 1886; Belgium, No. 77,223, dated April 26, 1887; Austria-Hungary, No. 8,814 and No. 30,450, dated July 22, 1887; England, provisional, No. 17,277, dated December 15, 1887,) of which the following is a specification.

This invention relates to devices for regulating the pressure of gas and other fluids; and it consists in an improved construction of pressure-regulators, as hereinafter described and claimed.

In the accompanying drawings, Figure 1 represents a vertical longitudinal section of a fluid-pressure regulator having my improvement. Fig. 2 is a horizontal section of the same. Fig. 3 is a vertical transverse section.

The casing of the device is formed of two parts A and B, the flanges of which are secured together by screws. A web or flexible diaphragm *d* extends horizontally through the interior and divides the same into an upper and a lower compartment, the edges of the diaphragm being fastened between the flanges of the casing. A flat spring *i* is secured between the flanges at one end of the casing and extends inward along the diaphragm a short distance. Two stiffening-plates *e* and *e'* extend from the spring *i* a suitable distance along the center line of the diaphragm, one being on each side of the same, and are fastened thereto and to the spring *i*, as shown. The casing is provided with an inlet-pipe *a* and a discharge-pipe *f*, both of which communicate with the lower compartment *c*.

A needle-valve *b* is placed within the casing, with its conical point in line with the inner opening of the pipe *a*, as shown. The shaft *t* of said valve extends into a tubular passage in the casing, which may be opened and closed from the outside by means of a screw-plug *k*. The needle-valve is partly threaded, and is screwed through a flanged nut or sleeve *s*, on which is loosely placed between the flanges a ring or collar *s'*, which is rigidly connected with a plate *e'*, which is secured to the diaphragm. The inner faces of the flanges of the nut *s* are beveled, being thinnest at their outer edges to facilitate the movement of the needle-valve, as hereinafter mentioned.

C indicates a tube extending from the upper part of the casing and located at or near the center, as shown, the said tube being provided with a screw-cap *v* at the top. A spring *n* is placed between the screw-cap and the diaphragm in position to bear against the latter, said spring being sustained by the studs *g*. A counter-spring *h* is placed in the compartment *c* on the same vertical line with the spring *n*, and extends from the plate *e'* on the diaphragm to the bottom of the casing, being sustained by the stud *g*.

The needle-valve in its usual position, when the diaphragm is not subjected to pressure, is open, and it is closed by the pressure of gas in the compartment *c* against the diaphragm, whereby the diaphragm is raised, thus bending the spring *i* and causing the ring *s'* to move slightly inward against the flange of the nut *s*, and moving the valve to its seat in the pipe *a*. Thus as the diaphragm is raised the valve is correspondingly moved toward its seat, checking the flow of gas and producing a low degree of pressure in the chamber *c*. The degree of pressure having been reached, the gas passes from the chamber *c* through the pipe *f*.

The casing may be provided with a safety-valve and a manometer (not shown) to indicate the degree of pressure in the chamber *c*. In case higher pressure is required the regulating-cap *v* is screwed down, compressing the spring *n*, which bears against the diaphragm, causing the valve *b* to open somewhat farther, and the valve so remains until such higher pressure is reached. When, on the other hand, the cap *v* is raised by unscrewing it, so that there is no pressure from

the spring n, the counter-spring h presses upward against the plate e' of the diaphragm and closes the valve.

This pressure-regulator may be used for regulating the pressure of various gases and fluids—for instance, highly-pressed carbonic-acid gas. There being little or no friction to impede the working of the operative parts, which are simple in construction and durable, the regulation is very exact, so that, for instance, a pressure equal to that of sixty atmospheres, or eight hundred and forty pounds, to the square inch from one side may be reduced to one-twentieth of the weight of an atmosphere, or about two-thirds of a pound, to the other side, even should the flowing gas be suddenly stopped.

In operation, supposing the device to be applied to a keg of beer, the iron vessel (not shown) containing the carbonic acid is connected by a suitable pipe with the pipe a, and a rubber pipe leading to the keg is connected with pipe f. The valve of the iron vessel being opened, the gas passes at full pressure to the compartment c of the regulator. The manometer, being in proper condition, should then indicate a low degree of pressure. The cap v being then screwed down, the needle of the manometer begins slowly to rise, and the cap is turned slowly until the required degree of pressure is reached, the gas being conducted to the keg, which may be left the whole day under the same regulated low pressure, and the beer may be drawn slowly or rapidly, the passage from the iron vessel being fully open. The said vessel should be closed only in case lower pressure is required, and after it is closed the remaining gas is used until the manometer indicates a quite low degree of pressure. The cap v is then unscrewed, whereby the needle-valve is closed. The iron vessel is then reopened and the said cap is slowly turned until the required degree of pressure is obtained. During the night the iron vessel is kept closed.

I claim—

1. In a pressure-regulator, the combination, with the casing, of a flexible diaphragm provided with stiffening-plates and a spring secured at one end to the casing, a valve connected with the diaphragm, two springs in positions to press, respectively, the opposite sides of the diaphragm, and a screw-cap by which one of said springs may be compressed, substantially as described.

2. The combination, with a flexible diaphragm d, which is provided with stiffening-plates, of a spring i, connected with the casing, a valve b, provided with a nut s, and a collar s', which is firmly connected with the diaphragm, substantially as and for the purposes described.

3. In combination with the casing provided with an aperture and a screw-plug to close the same, a needle-valve b, which extends into said aperture, a flanged nut on said valve, a collar placed loosely on said nut, and a flexible diaphragm with which said collar is firmly connected, substantially as set forth and described.

In witness whereof I have hereunto set my hand in presence of two witnesses.

EMIL ANDRE.

Witnesses:
E. PHILIPP THAL,
THEODOR LANGE.