(No Model.)

# C. A. REMPEN & E. ANDRE.

## PRESSURE REGULATING VALVE.

No. 479,462. Patented July 26, 1892.

Fig. 1.

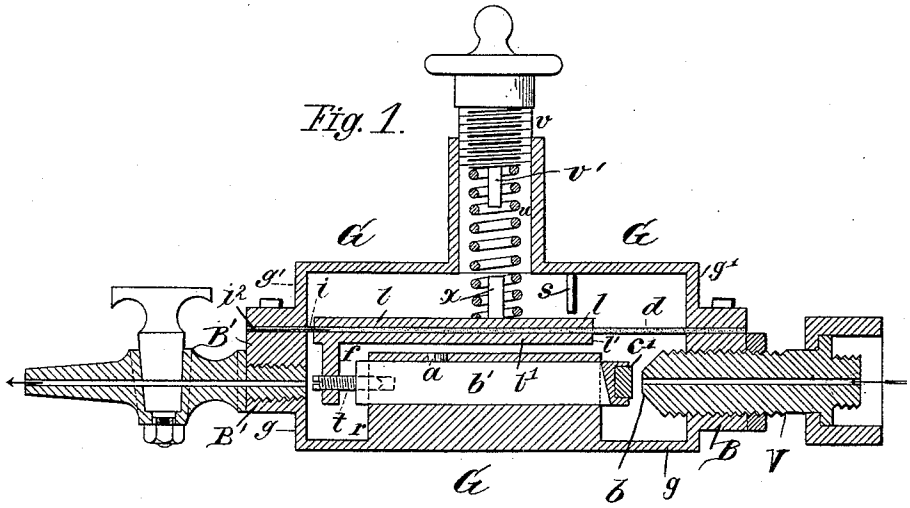
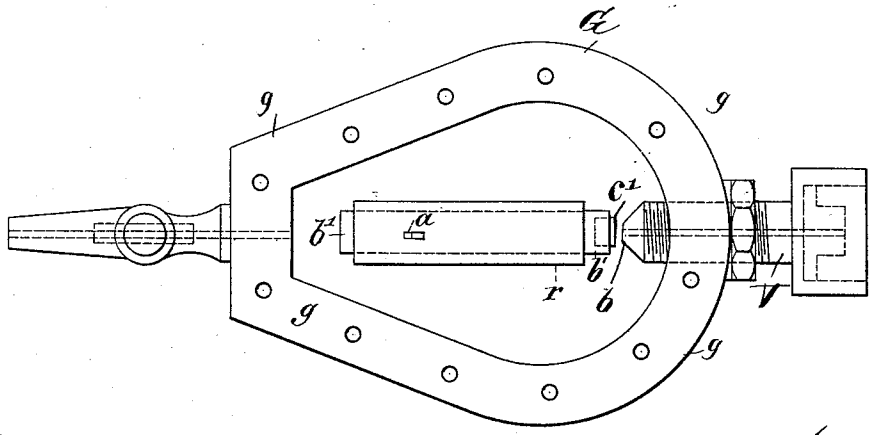



Fig. 2.




Witnesses.
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per
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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

# UNITED STATES PATENT OFFICE.

CARL AUGUST REMPEN AND EMIL ANDRE, OF HANOVER, GERMANY, ASSIGNORS TO FRANZ HEUSER & CO., OF SAME PLACE.

## PRESSURE-REGULATING VALVE.

SPECIFICATION forming part of Letters Patent No. 479,462, dated July 26, 1892.

Application filed October 12, 1889. Serial No. 326,810. (No model.) Patented in France June 24, 1886, No. 176,992; in Germany March 16, 1889, No. 53,170; in England July 26, 1889, No. 11,925; in Italy September 30, 1889, XXIII, 25,903, and L, 104, and in Austria-Hungary December 19, 1889, No. 32,900 and No. 63,698.

*To all whom it may concern:*

Be it known that we, CARL AUGUST REMPEN and EMIL ANDRE, of Hanover, in the Kingdom of Prussia and German Empire, have invented a new and useful Improvement in Pressure-Regulating Valves, (for which Letters Patent have been obtained in Great Britain under date of July 26, 1889, No. 11,925; in France by a Certificate of Addition dated July 26, 1889 and forming part of Letters Patent No. 176,992, dated June 24, 1886, in the name of J. L. Marting & Co.; in Germany under date of March 16, 1889, No. 53,170, in the name of Franz Heuser & Co.; in Austria,-Hungary under date of December 19, 1889, No. 32,900 and No. 63,698, in the name of said Franz Heuser & Co., and in Italy under date of September 30, 1889, Vol. XXIII, No. 25,903, and Vol. L, No. 104, in the name of said Franz Heuser & Co.,) of which the following is a specification.

Referring to the drawings, Figure 1 is a vertical longitudinal section of a pressure-regulator embodying our invention. Fig. 2 is top plan view of the lower portion of the valve-casing.

Our invention relates to pressure-regulators; and it has for its object certain improvements on similar apparatus for which Letters Patent of the United States were granted to Emil Andre on June 4, 1889, No. 404,586, whereby the valve mechanism is rendered more sensitive and efficient in operation and less liable to get out of repair.

The invention consists in structural features and combinations of parts, as will now be fully described, reference being had to the drawings, in which G indicates the valve-casing, having the general form of a horseshoe and constructed in two parts $g$ and $g'$, between which the diaphragm $d$ is secured, said diaphragm being stiffened by means of two plates $l$ and $l'$, extending along the center of the diaphragm a suitable distance, and are fastened thereto on opposite sides, one end of said plates being at a slight distance from the casing, so that the diaphragm can vibrate as on a hinge-joint $i$.

In order to prevent undue wear of the diaphragm at the point $i$, we preferably interpose between the lower plate $l'$ and the diaphragm $d$ and the casing an elastic metallic plate $i^2$. The diaphragm $d$ may be of any usual or preferred material—such as rubber, leather, &c.—and such diaphragm may be provided with a backing of a wire fabric.

The features just described and shown in the drawings are substantially the same as the corresponding features shown and described in the patent above referred to. The diaphragm $d$ divides the casing into two chambers, the lower chamber or section $g$ of the casing being provided with two interiorly-screw-threaded branches B and B′ diametrically opposite each other. In the branch B is seated a plug V, that has an axial passage, and on its inner end is conical to form a valve-seat $b$, said plug constituting the inlet branch, and in the branch B′ is secured a discharge-nozzle provided with a suitable stop-cock. On the bottom of the lower section $g$ is formed a tubular bearing $r$ for a cylindrical valve $b'$, provided at one end with a valve-face $c'$, adapted to co-operate with the seat-face $b$ of plug V to control the admission of fluid to the valve-chamber, said valve having a radial lug $a$ projecting into a longitudinal slot of the bearing $r$, whereby said valve $b'$ is properly guided in its movements to and from its seat $b$. The required movements of the valve $b'$ are communicated thereto by the diaphragm $d$, the lower stiffening-plate $l'$ of which has a downwardly-projecting arm $f$, provided with a screw-threaded opening for the screw-threaded valve-stem $t$, whereby said valve may be adjusted relatively to and independently of the adjustment of its seat $b$ or plug V. It is not absolutely necessary that the screw $t$ should be directly connected with the valve $b'$, as said screw may simply bear on the end of said support and hold the valve in contact with or in close proximity to its seat $b$. When the screw $t$ is not directly connected with the valve $b'$, the incoming fluid will move said valve, when the diaphragm has again assumed the normal position from which it was moved under an increase in the pressure. The stiffening-plates $l$ and $l'$ may

also be used as a means for loading the diaphragm to given pressures. It is, however, well known that where the pressure of a fluid is liable to considerable and sudden fluctuations the vibrations of the diaphragm are also considerable and sudden, thus rendering it liable to speedy wear at the line of connection with the valve-casing. To obviate this, we employ, in conjunction with the diaphragm-plates, a spring *u*, one end of which bears against the plate *l* and the other against the screw-plug *v*, and is kept in proper position by pins *x* and *v'* on said plate and plug, respectively. By means of the screw-plug the tension of the spring, and consequently the power exerted thereby, can be regulated. Any sudden or violent upward movement of the diaphragm will thus be taken up by the spring which acts as a buffer; but in order to limit the amplitude of the upward movement of the diaphragm *d*, and thus avoid undue wear at the confined edges, we provide a stop *s*, as shown. It is obvious that as the pressure below the diaphragm *d* increases beyond that to which it is loaded said diaphragm will be forced upwardly, owing to the greater area of diaphragm exposed to the influence of the fluid relatively to the small area of valve *b'*—that is to say, the diaphragm will vibrate on its hinge-joint *i* in an upward direction and the arm *f* will thereby be moved from left to right, carrying the valve *b'* in a like direction or toward or to its seat *b* to more or less obstruct the inflow of the fluid or cut it off altogether, according to the increase of the pressure within the regulator. A reverse movement of the diaphragm will take place as the pressure diminishes.

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

1. A diaphragm pressure-regulator comprising a casing have inlet and outlet passages, a tubular valve-bearing on the bottom of the casing, a cylindrical valve *b'* in said bearing operating to control the flow of liquid through the passage, a flexible diaphragm above the inlet and outlet passages, stiffening-plates *l* and *l'*, secured to the opposite faces of the diaphragm near one end thereof to form a hinge-joint *i*, an arm depending from the lower plate *l*, connected with the valve, and an abutment for limiting the amplitude of vibration of said stiffened diaphragm, substantially as and for the purpose set forth.

2. A diaphragm pressure-regulator comprising a casing having inlet and outlet branches, said inlet branch being adjustable in its bearings in the casing and having a valve-seat formed at its inner end, a tubular bearing on the bottom of the casing, a valve *b'* in said bearing operating to control the flow of liquid through the inlet branch, a flexible diaphragm above said inlet and outlet branches, stiffening-plates *l* and *l'*, secured to the opposite faces of the diaphragm near one end thereof to form a hinge-joint *i*, and a connection between the lower plate and the valve *b'*, substantially as and for the purpose set forth.

In testimony whereof we affix our signatures in presence of two witnesses.

CARL AUGUST REMPEN.
EMIL ANDRE.

WM. G. SPALDING,
JOHS. KRACKE.