(No Model.)

E. N. DICKERSON & J. J. SUCKERT.

PRESSURE REDUCING VALVE.

No. 571,346. Patented Nov. 17, 1896.

Fig. 2.

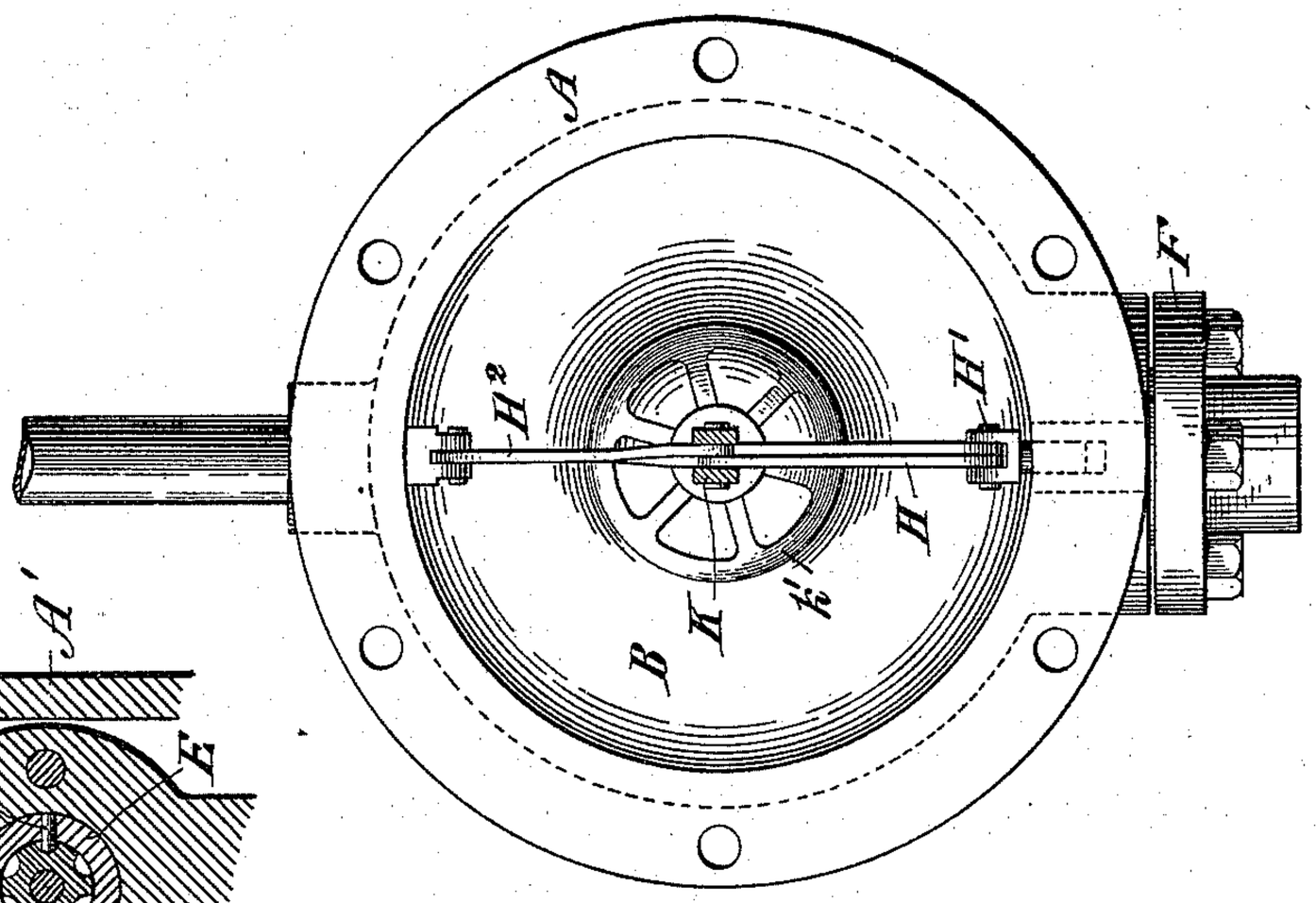


Fig. 3.

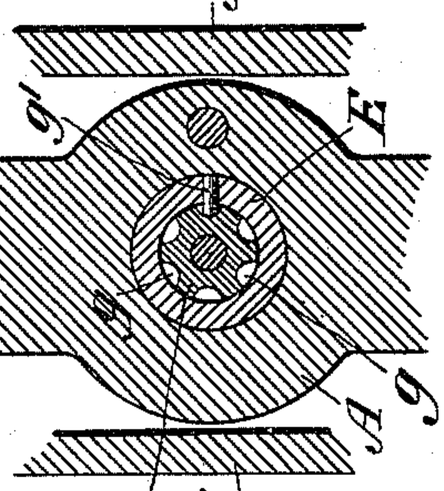
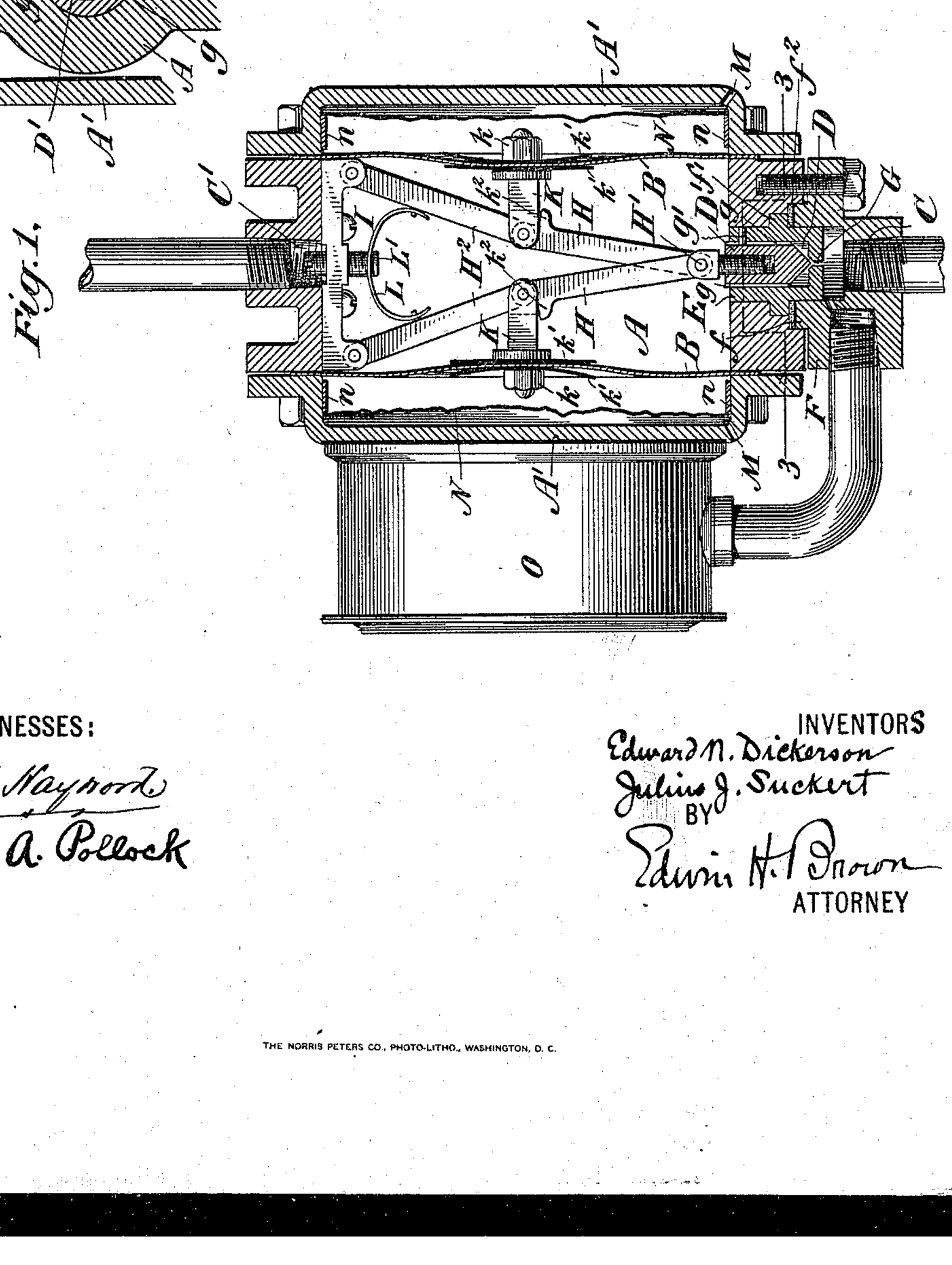


Fig. 1.



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EDWARD N. DICKERSON, OF NEW YORK, N. Y., AND JULIUS J. SUCKERT, OF RIDGEWOOD, NEW JERSEY.

PRESSURE-REDUCING VALVE.

SPECIFICATION forming part of Letters Patent No. 571,346, dated November 17, 1896.

Application filed June 22, 1895. Serial No. 553,676. (No model.)

To all whom it may concern:

Be it known that we, EDWARD N. DICKERSON, of the city, county, and State of New York, and JULIUS J. SUCKERT, of Ridgewood, Bergen county, New Jersey, have invented a new and useful Improvement in Pressure-Reducing Valves, of which the following is a full, true, and exact description, reference being had to the accompanying drawings.

Our invention relates to apparatus designed to receive a gas or vapor under pressure and to deliver the same at a pressure differing from that at which it is received.

We will describe a pressure-regulator embodying our improvement and then point out the novel features in the claims.

In the accompanying drawings, Figure 1 is a central vertical section through a pressure-regulator embodying our improvement. Fig. 2 is an elevation of the regulator as viewed from the right of Fig. 1 with one of the cover-plates removed. Fig. 3 is a section on the plane of the broken line 3 3 of Fig. 1.

Similar letters of reference designate corresponding parts in all figures.

A represents the body portion of the pressure-regulator casing. It is shown to be cylindrical in form and closed at the ends by cover-plates A′ A′, secured by suitable fastening devices to the body portion. The interior space inclosed by the body portion and cover-plates constitutes a diaphragm-chamber. In the present instance we have shown two diaphragms B B, extending across the diaphragm-chamber. The diaphragms may conveniently be secured in place by clamping their edges between the body portion A of the regulator-casing and the respective covering-plates A′ A′.

The regulator is provided with an inlet-port C and an exhaust-port C′ for the influx and efflux of the gas, the former extending into the annular space between the diaphragms through a valve-controlled passage-way, while the latter is in free communication with said space. The ports C and C′ will preferably be threaded to engage with suitable pipes or conduits.

D is a valve-chamber provided with a valve D′, tapering or pointed at its outer end to impinge against the valve-seat at the lower surface of the valve-chamber.

Preferably the material forming the valve and the seat therefor will be of relatively different degrees of hardness that the valve may embed itself more or less in its seat—for instance, one may consist of bronze and the other of a softer alloy.

To provide a suitable material for the valve-seat, as well as to render the same readily removable for renewal purposes, we preferably form the valve-chamber D in a bushing E, fitting into an aperture in the side of the regulator. When this construction is adopted, the port C may well be formed in a separable piece or block F, secured to the regulator by suitable means, the block having an annular tongue f', engaging with an annular flange f' upon the bushing E to retain the latter in place.

Packing f^2 may well be interposed between the edges of the tongue f and flange f'.

G is the passage through the bushing E, whose extremity forms the seat for the valve D′.

The valve D′ is fluted or channeled longitudinally, as shown at g, for the passage of gas, while a pin g', secured to and extending from the bushing E, enters one of the flutes, preventing the rotation of the valve.

Links H H are pivoted at their lower ends to a stud H′, attached to the valve. At its upper end each link H is jointed to a second link H^2, which in turn at its upper end is pivotally secured to one end of a cross-piece I, secured to the upper portion of the diaphragm-chamber. Each pair of links H and H^2 forms a toggle or knuckle joint where the one is journaled to the other, the center lines of each pair of links when the valve is elevated from its seat being inclined toward the opposite pair.

K is a post pivoted at one end to the jointed portion of each pair of toggle-joint links H H^2 and at the opposite end rigidly secured to the diaphragm B, as by a nut and washers k k'. Preferably there will be provided an ear k^2 on each link H, upon which the post

K rests and upon which the weight thereof, as well as a portion of each diaphragm, is borne.

L is a bow-spring secured at opposite ends to the links H^2 H^2 and loosely supported by a screw L′, entering a tapped hole in the cross-piece I, this construction affording ready means for adjusting the pressure at which the gas is delivered.

One or more openings M are provided in each covering-plate A′ that the atmosphere may have access to the outer surface of the corresponding diaphragm. A strainer N, of canvas or other open material, may be secured, for instance, by a flexible band *n*, within each cover-plate to prevent contact of dust with the diaphragm.

O is a pressure-gage secured to the side of the regulator, having a conduit or pipe open to the full pressure of the entering gas.

It will be seen that this construction is well adapted to secure a change in pressure of a high-pressure gas, since a slight change in pressure in the diaphragm-chamber causing a slight movement of the diaphragm will exert through the action of the toggle-joint links a very great pressure upon the valve to force the same to its seat against the resistance of the entering gas, and that this pressure increases as the center lines of the links in each pair of links approach parallelism.

We have shown two diaphragms and two pairs of toggle-joint links; but it is evident that the operation of the apparatus is not dependent upon this duplication, since if one diaphragm is rendered accidentally inoperative the corresponding passage M may be closed, and the other diaphragm will then fulfil the functions of the apparatus.

The operation of the regulator may be described as follows: The high-pressure gas, entering the diaphragm-chamber through the passage-way G, exerts an outward pressure upon the diaphragms B B, expanding the same and causing the toggle-joint links to straighten out, thereby forcing the valve D′ toward its seat and throttling the entering gas, reducing the pressure thereof as it passes to the diaphragm-chamber. Any change of pressure in this chamber is responded to by the diaphragms and by them communicated to the valve to increase or decrease the throttling action, as the case may be.

Having described our invention, what we consider as new, and desire to secure by Letters Patent, is—

1. In a pressure-regulator the combination with a plurality of flexible diaphragms, of a scored or fluted valve-plug, toggles secured at one end to the valve-plug and at the other end to the interior of the pressure-chamber, links connecting the toggles with the flexible diaphragms, a spring bearing upon one of the arms of the toggles to control the valve-opening, and means for regulating the pressure exerted by said spring, substantially as specified.

2. In a pressure-regulator the combination with a plurality of flexible diaphragms, of the block F, valve D′, bushing E, the packing-ring intermediate of the bushing E and block F, toggles secured at one end to the valve-plug and at the other end to the interior of the pressure-chamber, links connecting the toggles with the flexible diaphragms, a spring bearing upon the toggle-arms, and means for controlling the pressure of said spring, substantially as specified.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

E. N. DICKERSON.
JULIUS J. SUCKERT.

Witnesses:
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