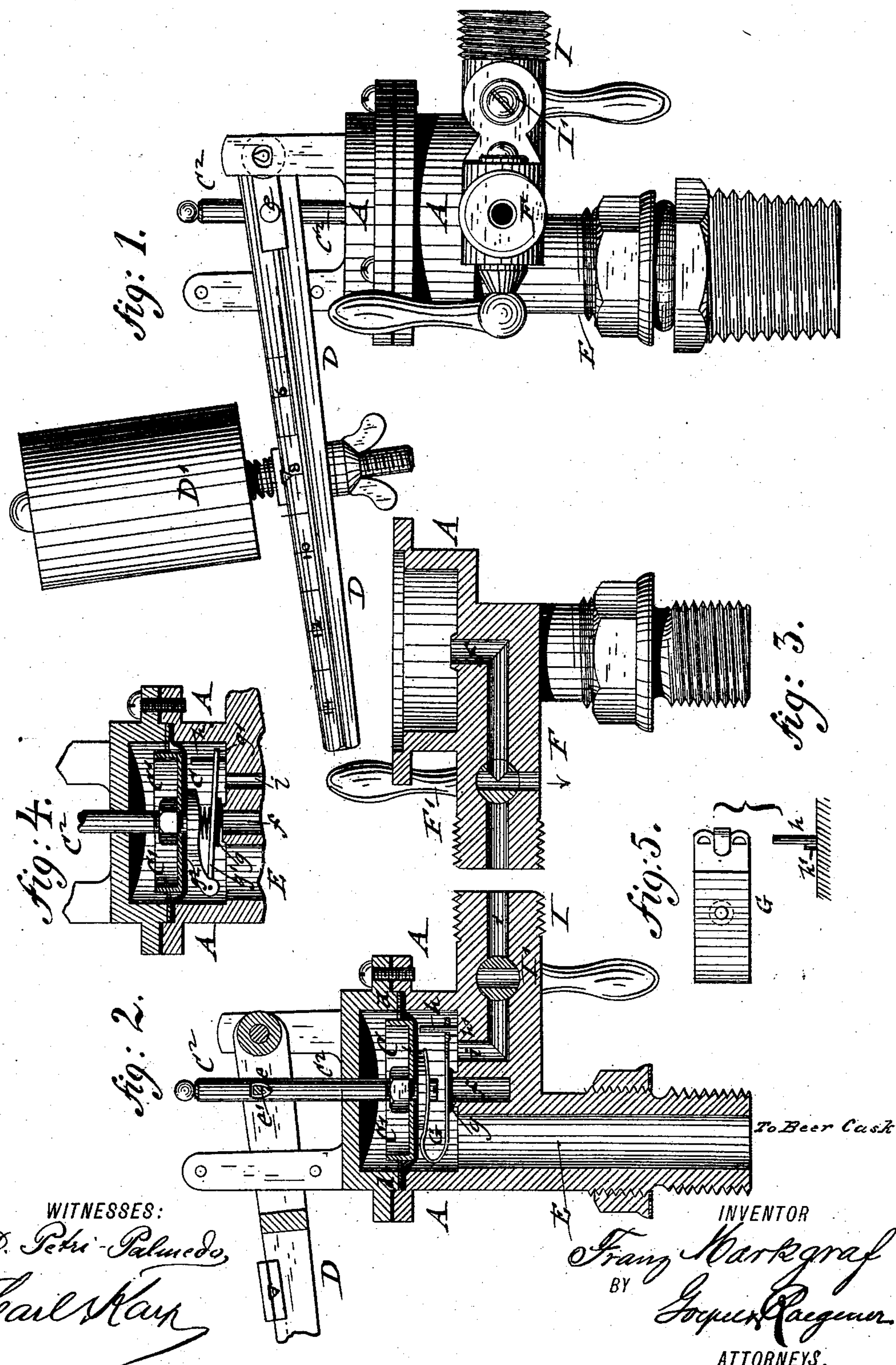


(No Model.)

F. MARKGRAF.
PRESSURE REGULATING VALVE.

No. 376,101.

Patented Jan. 10, 1888.



WITNESSES:

D. Petri-Palmedo,
Carl Marx

INVENTOR

Franz Markgraf
BY
Lorenz Raegenor
ATTORNEYS.

UNITED STATES PATENT OFFICE.

FRANZ MARKGRAF, OF NEW YORK, N. Y.

PRESSURE-REGULATING VALVE.

SPECIFICATION forming part of Letters Patent No. 376,101, dated January 10, 1888.

Application filed January 20, 1887. Serial No. 224,245. (No model.)

To all whom it may concern:

Be it known that I, FRANZ MARKGRAF, of the city, county, and State of New York, have invented certain new and useful Improvements in Pressure-Regulating Valves, of which the following is a specification.

This invention relates to improvements in that class of pressure-regulating valves in which a diaphragm and a valve connected to said diaphragm are employed for regulating the gas-pressure in a suitable vessel and permitting the escape of gas from the same whenever the pressure in said vessel rises beyond the normal pressure, to which the diaphragm of the regulating-valve is adjusted.

The invention relates more especially to a valve for regulating the pressure in casks of beer and other fermented liquors, so that the surplus of carbonic-acid gas generated in the same escapes automatically and in a very reliable manner when the pressure in the cask rises above the normal pressure in the same.

The invention consists of a closed casing provided with a flexible diaphragm, the stem of which is acted upon by a weighted lever, and with supply and discharge channels. To the under side of the diaphragm is applied a curved spring, that carries a valve located above a valve-seat of the discharge-channel, the free end of the spring being guided on fixed studs having rests for the spring, as will be described more fully hereinafter, and finally be pointed out in the claim.

In the accompanying drawings, Figure 1 represents a side elevation of my improved pressure-regulating valve. Fig. 2 is a vertical central section of the same. Fig. 3 is a vertical section on line *x x*, Fig. 1, taken at right angles to the former. Fig. 4 is also a vertical central section of the pressure-regulating valve, showing a modified construction of the same; and Fig. 5 are details of the valve-spring and the studs for guiding the same.

Similar letters of reference indicate corresponding parts.

Referring to the drawings, A represents a closed valve-casing which is made of two sections, the lower section being cast integral with the supply and discharge channels, through which the gas is conducted from the

cask to the chamber below the diaphragm and from said chamber to the atmosphere. The upper section of the valve-casing A is provided, like the lower section, with flanges and attached to the same by screws. A flexible diaphragm, C, is interposed between the upper and lower sections of the valve-chamber A and retained firmly by the same, in connection with an interposed ring-shaped washer, *d*. A re-enforcing metal cup, C', is applied to the upper side of the flexible diaphragm C, said cup carrying a central spindle, C², which passes through the top of the valve-casing to the outside of the same. The spindle C² is provided with a transverse opening, *e*, Fig. 2, through which passes the knife-edged fulcrum *e'* of a lever, D, which is pivoted to a post on the top of the upper section of the valve-casing, and which is made of two parallel arms that are guided by a second post, also at the upper section of the valve-casing, said post being provided with stop-pins at the upper and lower ends, between which the lever D oscillates. The pivot of the lever D is also formed with knife-edges, as shown in Fig. 1, so as to reduce thereby the friction of the same with the post and the spindle C².

On the two-armed lever D is guided an adjustable weight, D', which is applied thereto by a screw-shank and thumb-screw, said weight resting on a spiral spring placed around a stem, so as to be properly cushioned. The lever D is graduated and the weight adjusted to said graduation by a slide-piece having a knife-edged index or pointer, as shown in Fig. 2.

The lower section of the valve chamber A is provided with a threaded supply-pipe, E, that is screwed into the bushing of the cask, a rubber gasket and screw-nut on said pipe forming, with the head of the bushing, a kind of stuffing-box for preventing the escape of gas between the bushing and the supply-pipe. The supply-pipe E terminates in the chamber below the diaphragm C. At the center of the valve-chamber and the lower part of the same is arranged a discharge-channel, *f*, of smaller size than the supply-pipe E, said discharge-channel extending at right angles through a laterally-extending pipe, F, of the lower part of the valve-chamber, said pipe F being pro-

vided with a two-way cock, F', and a threaded end, to which latter a rubber tube may be coupled in case the carbonic-acid gas that is conducted off through the valve-casing and discharge-channel is desired to be utilized. If this be not desired, the two-way cock is set so as to establish communication with a downwardly-extending channel, f', through which the carbonic-acid gas is then discharged directly to the atmosphere, as shown in Fig. 3. The discharge-channel f is closed by a valve, g, which is applied to a curved spring, G, that is attached to the under side of the diaphragm, as shown in Fig. 2. In place of the bent valve-spring G, a stop, g', that is hinged to a bracket-arm, g², at the under side of the diaphragm, and acted upon by a spiral spring, may be used, as shown in Fig. 4. The free lower end of the spring G or hinged strap g' is guided by openings on upright lugs h, and pressed by the weighted lever D on projecting shoulders or rests h' of the lugs. (Shown in Fig. 5.) The lugs h are secured to the bottom of the valve-chamber. When the pressure on the cask or other vessel to which the regulating-valve is applied rises above the normal pressure to which the weight is adjusted on the lever D, the diaphragm is raised, and thereby the valve g is lifted and placed into an inclined position relatively to the valve-seat of the discharge-channel f, so as to partly open the discharge-opening d and permit the escape of gas until the normal pressure is re-established and the valve g pressed tightly on its valve-seat. The higher the pressure in the cask the more will the diaphragm, and consequently the spring and its valve, be raised. The outer end of the spring g retains its position on the shoulders of the lugs h except when an extra high pressure is exerted on the diaphragm, in which case the spring G is lifted bodily with its valve.

By pressure slightly above the normal pressure, the valve vibrates on the valve-seat without entirely opening the discharge-channel. The movements of the spring G, in following the motion of the diaphragm, cause the valve g to vibrate toward and away from the valve-seat, and serve thereby to overcome a very objectionable feature of the pressure-regulating valves heretofore in use—namely, the gumming of the same, owing to the saccharine matter in the beer or other liquids, by which gumming these valves were made to adhere to the valve-seats and rendered unreliable.

The lower section of the valve-chamber A

is further provided with a laterally-extending pipe, l, having a threaded end, which pipe extends at right angles to the discharge-pipe of the valve-chamber, and is provided with a channel, i, communicating with the bottom of the valve-chamber, and with a stop-cock, l', for opening or closing said channel. To the pipe l a hose is applied, so that when the stop-cock l' is opened compressed air can be conducted through the valve-chamber to the interior of the cask or other vessel, so as to rack off the beer or other fermented liquid in the same, whenever this is required. The valve and diaphragm regulate in this case the pressure of the air in the same manner as before and prevent a too great pressure being exerted on the cask, whereby the same may be injured.

I do not claim the arrangement of a conduit-pipe for compressed air, as this feature is well known in pressure-regulating valves used for the purpose described.

The main advantage of my improved valve construction is its high sensitiveness, even to small changes of pressure, owing to the arrangement of the valve on a vibrating spring or strap and the diminished friction of the knife edged pivots of the weighted lever.

I am aware that safety-valves have been constructed with a diaphragm which served to close an opening, and that a spring has been used for pressing said diaphragm upon said opening; but such device cannot have the rapid vibratory movements that the valve in my device has.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

The combination, with a valve-casing having a valve chamber, and supply and discharge channels in communication with said valve-chamber, of a flexible and weighted diaphragm supported by the valve casing, a U-shaped spring applied to the under side of the diaphragm and provided with guide-openings at its outer end, a valve applied to the free arm of said spring, said valve resting on a valve-seat at the end of the discharge-channel, and lugs having rests for guiding and supporting the free outer end of the valve-spring, substantially as set forth.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

FRANZ MARKGRAF.

Witnesses:

PAUL GOEPEL,
MARTIN PETRY.