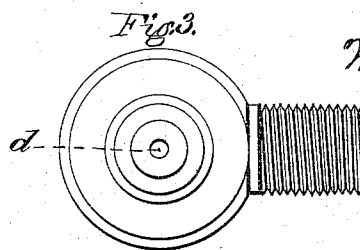
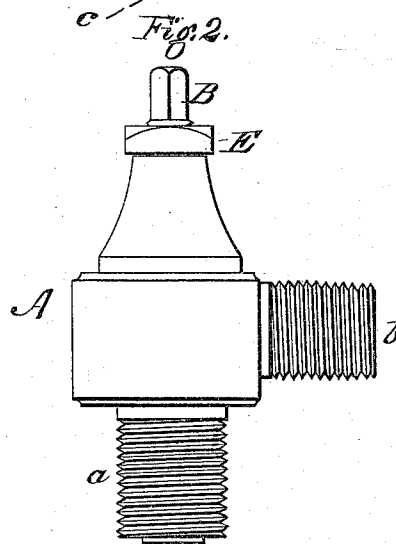
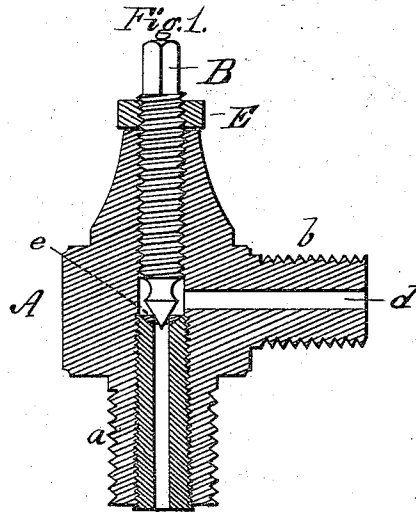


W. A. JOHNSTON.

Closing Vessels Containing Liquified Gases.

No. 152,844.

Patented July 7, 1874.



Witnesses:

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UNITED STATES PATENT OFFICE.

WILLIAM A. JOHNSTON, OF BROOKLYN, NEW YORK.

IMPROVEMENT IN CLOSING VESSELS CONTAINING LIQUEFIED GASES.

Specification forming part of Letters Patent No. **152,844**, dated July 7, 1874; application filed June 25, 1874.

To all whom it may concern:

Be it known that I, WILLIAM A. JOHNSTON, of Brooklyn, in the county of Kings and State of New York, have invented certain Improvements in Closing Vessels Containing Liquefied Gases, of which the following is a specification:

My invention relates to a cock, intended more especially for use on vessels containing liquefied nitrous-oxide gas, but adapted also for general use in retaining gases and fluids under very high pressures. The invention consists mainly in condensing or compressing the metal of which the cock is composed, in order to close its pores and prevent the gas from permeating the metal, and thereby escaping; but also further consists in providing the valve-seat with a bushing of compressed non-corrosive soft metal; in mounting said bushing on a removable plug or core; in using the soft-metal seat and a hard-metal valve-plug, or vice versa; and in applying a jam-nut to the outer end of the valve-plug, all as hereinafter more fully explained.

Figure 1 is a longitudinal central section through my improved cock; Fig. 2, an outside elevation of the same; and Fig. 3, an inner-end view of the same.

As is known by those familiar with the subject nitrous-oxide gas is now condensed to a liquid state in iron vessels or receivers of small size, which are put upon the market filled with the liquid, and sold to dentists, surgeons, and others who vaporize the gas as it is required for use. Each receiver contains a very large quantity of the gas, as it is necessary to condense the same until it attains a pressure of from eight hundred to one thousand pounds to the square inch before it assumes a liquid form. In consequence, however, of this high pressure it is found almost impossible to produce a cock which will prevent the leakage and escape of the gas. This leakage is due partly to defective joints, but mainly to the gas permeating the metal of which the cock is made. The cocks have been made of different cast metals, but as they were all of a cellular or porous structure the gas, when at a high pressure, would readily find its way through them. To prevent this leakage, as well as the leakage at the joints, is the ob-

ject of this invention. The main object I accomplish by condensing, compressing, or solidifying the metal of which the body of the valve is composed, in order to close all its cells, pores, or interstices and render it dense and close in texture. This is most advantageously done by swaging a solid wrought-iron or steel blank in a die or matrix; but the same end may be attained by drawing or forcing it through a compressing-die, or by passing it through suitable rolls. The swaging process is, however, considered the preferable one, both because it is more effective and because it admits of the body being readily made of any external form desired. After the blank has been compressed it is bored, shaped, and finished as usual. For use on the gas-receivers before mentioned, I ordinarily make the cock of the form shown in the drawings, although the form and construction are matters of secondary importance. The cock shown is provided with two necks, *a* and *b*, at right angles to each other, the former for connection to the gas vessel or receiver and the latter for connection with the charging or vaporizing apparatus. Through the necks I make central holes *c* and *d*, which join at their inner ends to permit the passage of the gas to and from the vessel. Centrally through the body of the valve I insert a screw-plug or valve, *B*, which has its inner end made of a conical form and arranged to enter and close the mouth of the hole or passage *e*, as shown in Fig. 1.

The valve constructed as above described, and having the condensed body, will be found a great improvement on all others heretofore produced, and tight and serviceable under all ordinary circumstances; but in order to remedy all trouble which would be liable to arise in any way, I add certain other features. In order to prevent the valve-plug *B* from becoming fastened to its seat by corrosion or oxidation of the parts, I secure in or around the mouth of the hole *c* a bushing of soft metal, *e*, which forms a seat for the end of the plug, as shown. The soft metal should be of such nature as not to corrode readily, and should, like the body, be compressed or condensed in order to close its pores and render it impermeable to the gas. It may be fused or screwed or forced into a recess or concavi-

ty in the body around the mouth of the hole *c*, or otherwise secured in place. Another and important advantage in using the soft metal is that the hard plug always embeds itself snugly and tightly therein, the metal adapting itself to the shape and irregularities of the plug, and producing a tight joint at all times when the cock closes.

In order to permit the more ready application of the soft seat or bushing it may be mounted, as shown, in a plug or core, *g*, screwed centrally into the neck, and having the hole or passage *c* made lengthwise through its center, as shown in Fig. 1. This plug or core should, like the body, be made of the condensed metal, and should be tapered down slightly toward its inner end, and provided on its outside with a screw-thread. The hole in the body should also be tapered and threaded in like manner to receive the plug or core. The plug or core is thoroughly tinned, and is screwed home to its place in the body while hot, so that it comes to a bearing its entire length, and is soldered securely to its place from end to end. When necessary, the plug can be unsoldered and unscrewed to withdraw the soft-metal seat or bushing from the body. Of course the screw-threads may be omitted, and the tapered and tinned plug or core simply forced or driven to its place, or it may be threaded a portion of its length and given a smooth taper the remainder. In short, the form and manner of securing the plug may be varied, as deemed best, or when desired the plug dispensed with entirely, and the soft metal seated directly in the body, which, in such cases, will be made in one piece entire and complete. The valve-plug *B* is preferably made of hardened steel, with its point turned smoothly to a true conical form, so that it will seat itself tightly in the soft metal and keep the seat in shape.

It is obvious that instead of using the soft seat and hard valve-point a hard seat and soft plug or point could be used, but not with as good results. In order to assist in rendering the cock tight and to prevent it from being opened accidentally I place a nut, *E*, on the outer end of the valve-plug, and when the cock is closed screw this nut up as tightly as possible against the end of the body.

Having thus described my invention, what I claim is—

1. A cock having the metal of which its body is composed condensed or solidified and its pores closed by swaging, forging, or equivalent means, substantially as described, and for the purpose set forth.
2. A cock having a seat or bushing of compressed or solidified soft metal, substantially as described, to form a bearing for the valve-plug.
3. In combination with the valve-body, the removable plug or core having the soft-metal seat or throat applied thereto, substantially as described.
4. The removable plug or core *g*, having a cavity, into which is fused brass, silver, or other metal or alloy, *c*, not readily corroded, to form a seat for the plug or valve.
5. A cock of wrought or swaged metal, having its seat or throat and its plug of different degrees of hardness—one of a soft metal or alloy not easily corroded, and the other of steel or other hard material, as and for the purposes described.
6. In combination with the body *A* and screw-plug *B* the nut *E*, applied as and for the purposes described.

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Witnesses:

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