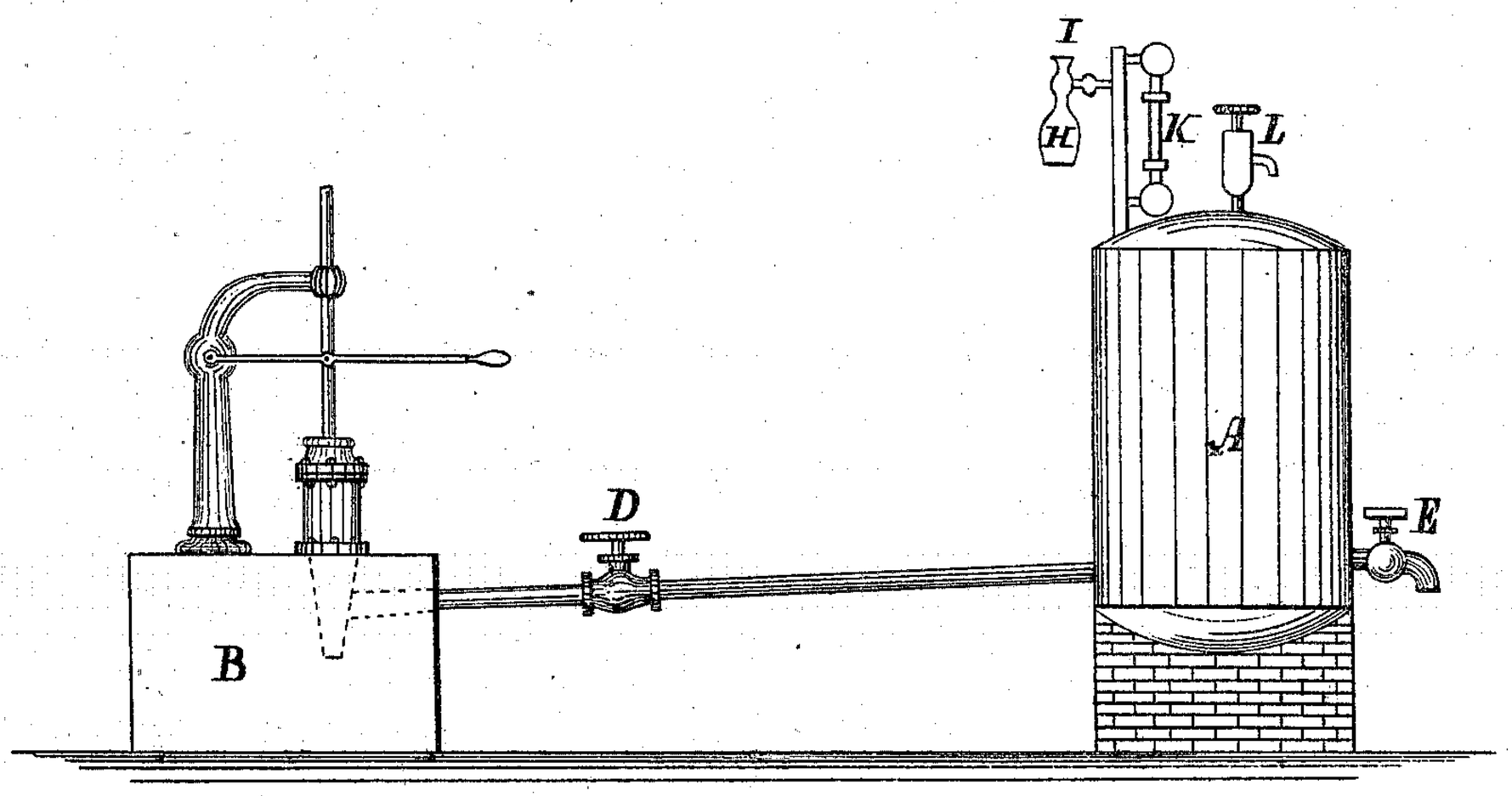
WILLBUR F. JOHNSTON & WILLIAM A. JOHNSTON.

Improvement in Apparatus for Liquifying Nitrous Oxide and other Gases.

No. 120,977. Patented Nov. 14, 1871.



WITNESSES:

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120,977

UNITED STATES PATENT OFFICE

WILBUR F. JOHNSTON AND WILLIAM A. JOHNSTON, OF BROOKLYN, NEW YORK.

IMPROVEMENT IN APPARATUS FOR LIQUEFYING NITROUS OXIDE AND OTRER GASES.

Specification forming part of Letters Patent No. 120,977, dated November 14, 1871.

To all whom it may concern:

Be it known that we, WILBUR F. JOHNSTON and WILLIAM A. JOHNSTON, both of Brooklyn, in the county of Kings and State of New York, have invented an Improved Process of Compressing and Liquefying Gases, of which the following is a specification:

The object of our invention is to accomplish the liquefaction, or, where that is impossible, the uttermost possible compression of gaseous or aeriform matter. This has been done in an experimental way by the use of air-pumps, and some very large and costly ones have been constructed with a view to continuous working on a large scale, but they have not been successful.

In practical working it has been found that as soon as the air-pumps were worked at any very high pressure the valves leaked; and further, the mechanical impossibility of bringing the surfaces of the piston exactly to the end of the cylinder causes a more serious difficulty. The gas left in the space between the piston and the cylinder-head expands immediately as the piston recedes, and so offers serious obstruction to the gas, which should be admitted as the piston approaches the other end of the cylinder. We obviate this difficulty by making use of some liquid, as water, to receive and transmit all pressure.

To accomplish our purpose we connect any approved hydraulic pump, B, of one or more cylinders, with a very strong tank, A, provided at some point with a means of attaching a strong bottle or receiver, H, in which to collect the product of the operation. At L is an opening, provided with a stop-cock, through which to admit the gas we intend to operate upon from its generator or its receiver, neither of which are here represented. Between the pump and the tank is a strong stop-cock, D, and another, I, between the tank and the bottle.

Having first filled the tank with water for the purpose of completely expelling the air from it, we admit into the tank through L whatever quantity of gas we propose to liquefy or condense, displacing, of course, a volume of water equal to the volume of the gas introduced. We then close the stop-cock L between the gasometer and the tank and open the stop-cock I between the receiver and the tank. By setting the pump in motion we now force water into the tank and so drive the gas into our receiver. We carry this compression to any point we choose, limited only by the strength of the receiver. The pressure required varies with the nature of the gas to be operated upon, but is often far greater than the valves of any air-pump can stand without leaking while employed to do more than experiment. Having driven the gas from our large tank into our receiver in either a liquid or very greatly compressed form, we close the stop-cock I and remove the bottle with its contents. Securing a second receiver to the same place and introducing another supply of gas, we again force water into the tank, and so the gas into our receiver, as before.

We find that we can in this way reduce one hundred gallons of nitrous oxide gas to the liquid form in about thirty minutes.

We claim—

The condensation or liquefaction of gaseous or aeriform matter by pressure transmitted from a pump by means of a liquid to the matter it is desired to condense.

W. F. JOHNSTON.
W. A. JOHNSTON.

Witnesses:
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