

J. BOYLE.

GAS LIQUIFYING PUMP.

No. 175,020.

Patented March 21, 1876.

Fig 1

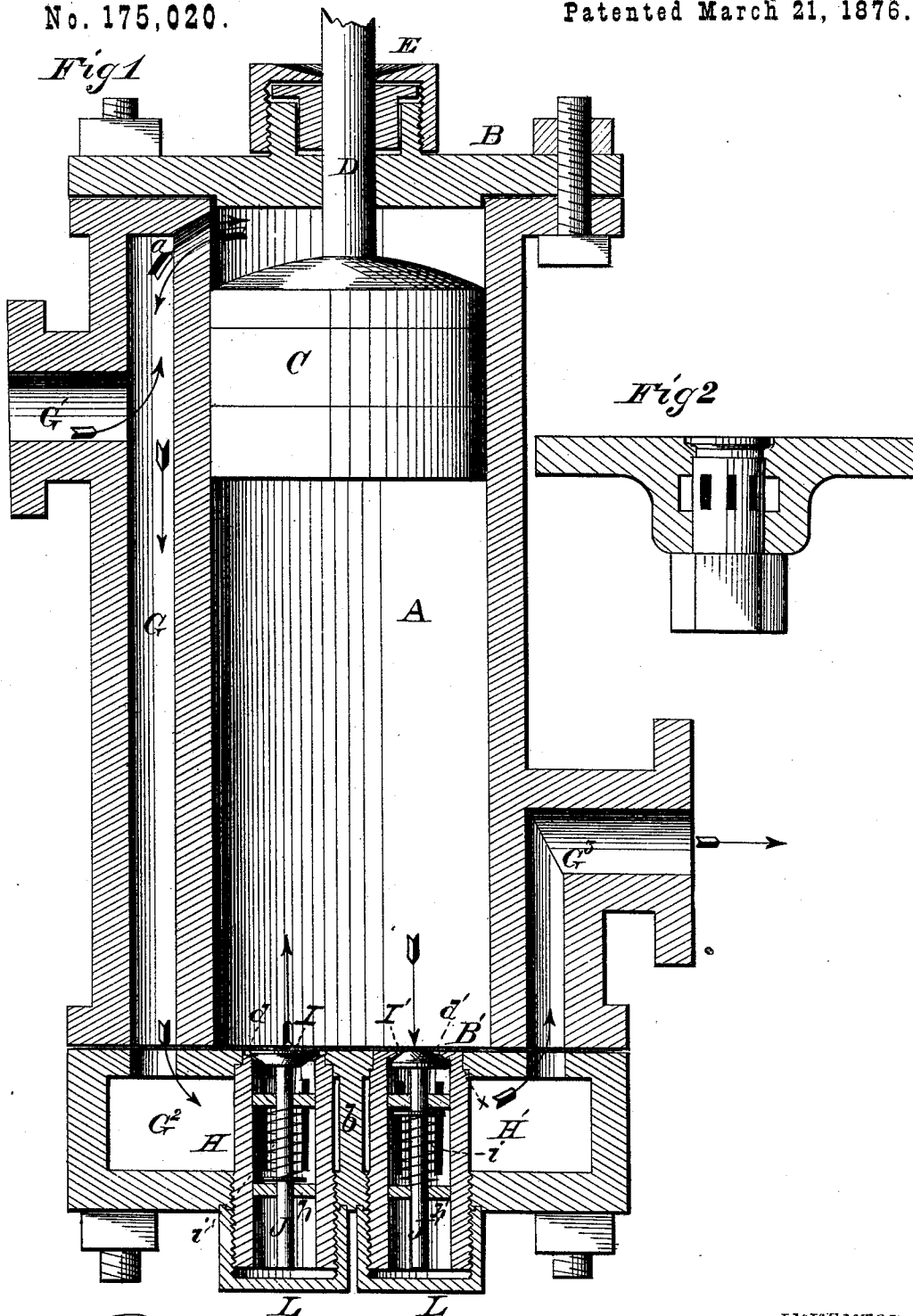


Fig 2

WITNESSES  
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# UNITED STATES PATENT OFFICE.

JAMES BOYLE, OF HOUSTON, TEXAS.

## IMPROVEMENT IN GAS-LIQUEFYING PUMPS.

Specification forming part of Letters Patent No. **175,020**, dated March 21, 1876; application filed November 24, 1875.

*To all whom it may concern:*

Be it known that I, JAMES BOYLE, of Houston, in the county of Harris and in the State of Texas, have invented certain new and useful Improvements in Gas-Liquefying Pump for Ice-Machines; and do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings and to the letters of reference marked thereon, making a part of this specification.

The nature of my invention consists in the construction and arrangement of a pump used in ice-machines for liquefying the gas, as will be hereinafter more fully set forth.

In order to enable others skilled in the art to which my invention appertains to make and use the same, I will now proceed to describe its construction and operation, referring to the annexed drawing, in which—

Figure 1 is a longitudinal section of my invention. Fig. 2 shows one of the valves therein.

A represents the pump cylinder, provided with heads B and B', bolted thereon in the usual manner. C is the piston or plunger, provided with the piston-rod D, which passes through the head B, and through a stuffing-box, D, thereon. G is a tube or chamber running the entire length on the outside of the cylinder, and provided with the air-inlet G<sup>1</sup>. This air-tube communicates with the interior of the cylinder A, close to the head B, through a passage, a, and at the other end it communicates with one end of an air-tube, G<sup>2</sup>, running across the head B' on the outer side. This air-tube G<sup>2</sup> is divided centrally by a cross-partition, b, and the other end of said tube communicates with the air-outlet G<sup>3</sup>. The various air tubes or chambers are preferably cast with a cylinder and head, as shown in the drawing, but may be arranged in any other suitable manner. Through the air-tube or chamber G<sup>2</sup>, on each side of the partition b, is screwed a cage,

the upper end of which extends up into an aperture in the cylinder-head B', and at the joint are suitable shoulders x x, so that when the cage is properly screwed up, the joint will be perfectly air-tight. On the upper end of the cage H is formed a seat, d, for the inlet-valve I, which has a stem or rod, J, extending downward through guides h h within said cage, and the valve held down to its seat by a spiral spring, i, surrounding the stem between the guides. On the upper end of the cage H' is formed a seat, d', for the outlet-valve I'. The valve-stem J', guides h', and spring i' are the same as in the first cage, except that the spring is arranged to hold the valve up to its seat. The lower ends of the cages H H' are closed by means of screw-caps L, forming tight joints with the chamber G<sup>2</sup>.

The operation of the pump is readily understood without further explanation.

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

1. In combination with the cylinder A, and its heads B B', the solid piston-head C, the tube G extending the entire length of the cylinder, the air-tubes G<sup>1</sup> G<sup>2</sup>, air-inlet a, cages H H', having valves I I', and the outlet G<sup>3</sup>, all constructed substantially as and for the purposes herein set forth.

2. In combination with the cylinder A and air-tube G<sup>2</sup>, the removable cages H H', provided with spring valves and exterior screw-threads, and exterior screw caps L L, all substantially as and for the purposes herein set forth.

In testimony that I claim the foregoing, I have hereunto set my hand this 29th day of October, A. D. 1875.

JAMES BOYLE.

Witnesses:

C. L. EVERT,  
E. A. METCALF.