D. Carpenter,

Air Pump.

No. 63,209. Patented Mar. 26, 1867.

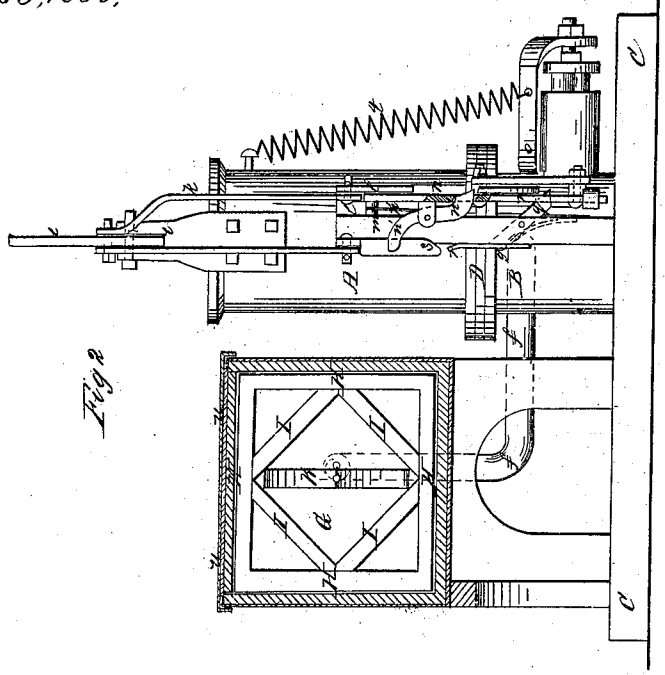

Fig. 2.

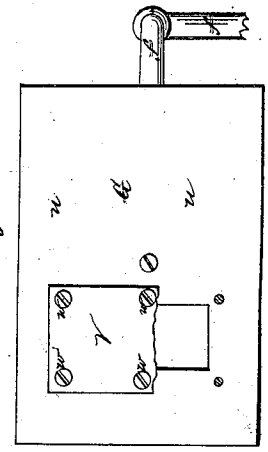

Fig. 4.

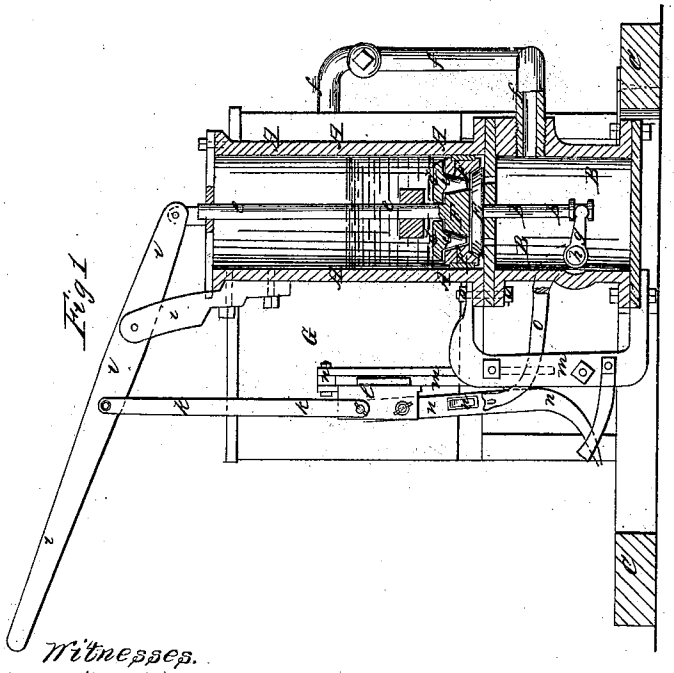

Fig. 1.

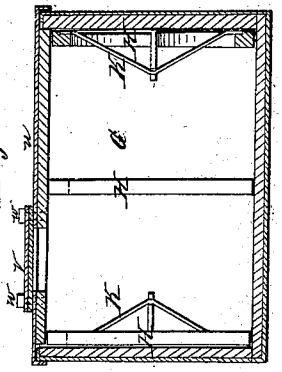

Fig. 3.

Witnesses.
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DANIEL CARPENTER, OF PEEKSKILL, NEW YORK.

Letters Patent No. 63,209, *dated March* 26, 1867.

IMPROVEMENT IN AIR-PUMPS.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that I, DANIEL CARPENTER, of Peekskill, in the county of Westchester, and State of New York, have invented a new and improved Air-Pump; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to make and use the same, reference being had to the accompanying drawings, forming part of this specification.

This invention relates to an air-pump of novel construction, which is to be applied for the purpose of creating a vacuum in boxes or vessels which are to be used for preserving meat, vegetables, or any other article. This invention will prove to be of especial value for long journeys on ships, but also for many other purposes.

The invention consists in such a construction of an air-pump that the valve below the piston is opened as soon, nearly, as the piston begins to move up, and will be held open until the upward stroke of the piston is finished. The valve will then be instantly closed, and the air contained in the pump between the piston and lower valve escapes during the downward stroke of the piston through valves arranged in the piston for the purpose. During the upward stroke of the piston the valves in the same are kept closed by their own weight, as well as by the pressure of water on top, and by the suction created below. The invention also consists in constructing, together with the air-pump, a box, from which the air is to be withdrawn, the box being made strong enough to bear the pressure of the atmosphere while a vacuum is produced in the inside. In the accompanying drawing my invention is illustrated—

Figure 1 being a side view, partly in section, of my improved air-pump.

Figure 2 is a front view, partly in section, of the same.

Figure 3 is a vertical longitudinal section of my improved box; and

Figure 4 is a plan or top view of the same.

Similar letters of reference indicate like parts.

A is the pump cylinder, made substantially as usual, and supported by a cylinder, B, to which it is secured by means of bolts *a a*. The cylinder B is firmly secured to a bed-plate, C, or to the floor of the chamber in which the machine is set up. A perforated false bottom, D, is arranged between the cylinders A and B, which serves as a guide for the stem *b* of the valve E. This valve E rests upon the plate D and effectually closes the holes in the same. The piston F is also perforated with tapering holes, which are closed by conical plugs *c*, which are arranged on an annular plate, *d*, sliding on the piston-rod *e*. The valve E is covered completely with rubber, and the lower surface of the piston F is recessed so as to fit exactly over the valve when down. *f* is the pipe which connects the lower cylinder B with the box G from which the air is to be removed. *g* is an eccentric-pin on a horizontal shaft, *h*, whereby the valve E is raised or lowered by oscillating the shaft *h*.

The operation of the pump is as follows:

Before commencing the piston is down and the valve E also, the piston fitting closely over the valve. Water, or some other fluid, is placed into the pump A to keep the joints tight and to prevent the escape of air in a wrong direction or through wrong channels. The piston is then raised by steam or hand power, and by any suitable mechanical device; and as soon as the piston has begun to move upward, the valve E will, by some device on the outside, hereinafter to be described, be raised from its seat D. The air is now expanded by the action of the piston and fills the cylinder A below the piston. As soon as (or nearly so) the piston is at the highest point the valve is closed also by some mechanism on the outside, hereinafter described, and then the air between the valve and piston can be expelled. The piston moves down again, and as soon as the air below is compressed enough that it will press stronger against the lower ends of the plugs *c* than the weight of the water and atmosphere on top, the ring *d* and plugs *c* will be raised and the air between E and F will escape through the said tapering holes in F. The valve E, being covered with rubber or any other elastic material, the concussion that would otherwise occur whenever the piston strikes the valve, is prevented. The chamber below the lower valve answers two purposes: first, to allow the pin *g* and stem *b* to move therein; and, second, it forms a receptacle for the water or other liquid used on the piston when in operation. The pipe *f*, which connects the pump with the box G, is secured to the upper end of the chamber B, so that the water that works through the valve while the same is being

opened or closed, falls by its own gravity into the chamber B, and does not obstruct the free passage of the air through the pipe *f*.

I will now proceed to describe the mechanism whereby the valve E is automatically opened or closed during the upward stroke of the piston. The piston-rod *e* is either operated by or connected with an oscillating lever, *i*, which is pivoted to an arm, *i'*, which projects from or above the cylinder A, as shown in fig. 1. On the other side of the pivoting point is, by means of a pivot secured to the lever *i*, a vertical rod, K, which by this arrangement moves down when the piston-rod goes up, and *vice versa*. The lower end of the rod K is secured to a slide, *l*, which moves up and down alongside of a slotted upright post *m*, by which it is guided, and which is stationary on the machine. To the lower end of the slide *l* is pivoted another bar, *n*, to which an elbow arm, *n'*, is pivoted, as shown in fig. 2. The horizontal shaft *h*, to which the pin *g* is attached, for raising and lowering the valve E, extends through the side of the cylinder B, being guided in appropriate stuffing-boxes. To its outer end is secured an arm, *o*, which extends to the bar *n* so that its end is slightly below the arm *n'* when the piston is down. The arm *n'* is held in the position shown in fig. 2, by a spring, *p*. As soon as the piston is raised the bar *n* will descend and the lower edge of the arm *n'* will press upon the end of the arm *o*, thereby turning the shaft *h* and opening the valve. When pressed down a certain distance the arm *o* passes over the end of a spring catch, *q*, which projects beyond the upright *m*, and which prevents the valve from closing. The arm *n'* is thrown off the arm *o* by an incline, *r*, which comes in contact with the rear end of *n'* and throws the front end back. The arm *o* is now released from *n'*, but is still held down (and the valve open) by the catch *q*, so that the piston may continue to rise and the valve be kept open at the same time. When the piston is almost up, a cam, S, on the slide *l*, strikes the rear end of the spring catch *q* and thereby moves its front end back, releasing the arm *o*. The latter is then instantaneously moved up (and the valve closed) by means of a spiral spring, *t*, shown in fig. 2. Thus it is seen that as soon as the piston rises the valve E will be opened and kept open until the piston is at its highest point, when the valve will instantaneously close, so that the air contained in the cylinder A may be removed through the valves *c c* as the piston descends. The box G, from which the air is to be removed, is to be of the strongest and most substantial construction. It is made of sheet metal or of any other suitable material, and is well braced on the inside by square framing H and by diagonal braces I, and also by combined diagonal and upright metal braces K, as shown in figs. 2 and 3. The lid *u* is firmly secured and cannot be removed. The only opening to the box is a small hole in the lid, which is covered by a plate, V, the latter being firmly held in place by means of bolts or screws *w*, as shown in figs. 3 and 4. The box may either be permanently secured to the pump or it may be removable, as may be desired.

What I claim as new, and desire to secure by Letters Patent, is—

1. I claim the mechanism, herein shown and described, of operating the valve E automatically by the same power which operates the piston, so that the valve is opened and closed and the piston raised and lowered, substantially in the manner herein set forth.

2. I claim the piston F and valve E when so constructed that the piston fits perfectly over the valve, so that all the air is completely forced out of the cylinder A at each stroke of the piston, through the valves *c c*. substantially as herein shown and described.

3. I claim the perforated piston F in combination with the ring *d* and conical plugs *c c*, all made and operating substantially as herein shown and described.

4. I claim the arrangement, in the chamber B below the valve E, of the valve-operating parts, substantially as and for the purposes herein shown and described.

5. I claim the box G when constructed as herein shown and described, and when provided with braces H I and K, all made as set forth, in combination with the pipe *f* and air-pump A B, the latter being made and operating substantially as herein shown and described.

DANIEL CARPENTER.

Witnesses:

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JAMES DENIKE.