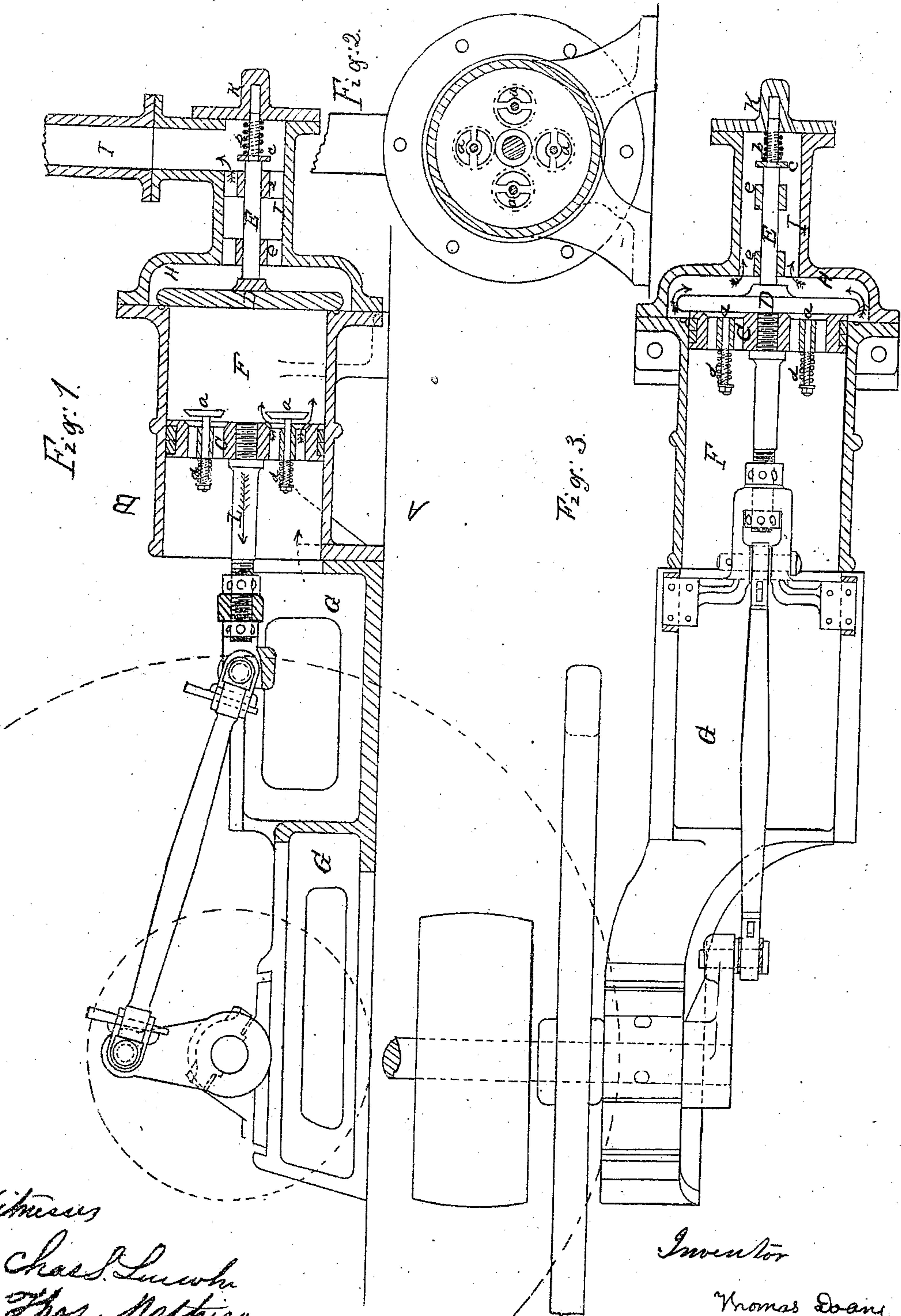


T. Doane. Air Pump.

N^o 72820

Patented Dec. 31, 1867.



Witness
Chas. L. Lusk
Thos. Nathison.

Inventor
Thomas Doane

UNITED STATES PATENT OFFICE.

THOMAS DOANE, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN AIR-PUMPS.

Specification forming part of Letters Patent No. 72,820, dated December 31, 1867.

To all whom it may concern:

Be it known that I, THOMAS DOANE, of Boston, in the county of Suffolk and Commonwealth of Massachusetts, have invented a new and useful Improvement in Air-Pumps; and I do hereby declare that the following is a full and accurate description thereof.

My improvement consists in constructing and arranging an air-pump or compressor in such a manner that the outlet or eduction-valve covers the whole base of the cylinder, and so as to yield and move away from its seat upon impact with the piston, in which are the inlet or induction-valves, the eduction-valve being pressed toward its seat by spring-pressure.

The object of this arrangement is to allow the working-piston to travel closely up to the outlet-valve, and even to lift it from its seat, thus discharging every particle of air or gas in the cylinder, making the pump more effectual in its operation.

If, as heretofore done, a head containing both inlet and outlet valves is screwed solid against the end of the cylinder, then the working-piston cannot discharge all the air or gas, or other fluid, because sufficient allowance has to be made for expansion and contraction for different temperatures, as also, and mainly, for the wear of connecting-rod pins and journals. The smallest quantity of air or gas remaining in the cylinder will greatly diminish the effect of the pumps.

To enable others skilled in the arts to make and use my invention, I will proceed to describe its construction and operation with reference to the accompanying drawings, and letters of reference marked thereon.

Figure I is a longitudinal section of the pump. Fig. II is a cross-section on line A B. Fig. III is a plan, with cylinder in section, showing the piston at end of outward stroke.

F, in Figs. I and III, is the cylinder of the pump, made of cast-iron, or any other suitable material. A frame or bed-plate, G, is secured to the front end of the cylinder F, said frame containing the slides for cross-head and box for crank-shaft.

The piston C, provided with a suitable packing, reciprocates in the cylinder in the usual manner by means of piston-rod, connecting-rod, and crank, and may be driven by a belt and pulley, or gearing, or a direct attachment of any motor. The piston C is provided with

inlet-valves *a a*, (four or more or less in number, according to size,) which are kept closely to their seats by suitable spiral springs *d d*, or springs of rubber or other suitable material. These valves, when closed, form a plain smooth surface with the front end of the piston.

The cylinder F is furnished with a head, H, and discharge-pipe, I, which at the same time form a receptacle for the outlet-valve D, made of brass or any other suitable material, and provided with a stem, E, which guides the valve in the bearings *e e* of the discharge-pipe I. The end of the stem E is provided with a spiral spring, *b*, or any other suitable spring, which, resting against the small cover K, acts against the washer *c* on the stem E, and keeps the valve D to its seat with a moderate pressure.

The operation of my improved pump is as follows: At the outward stroke of the piston, in direction of the arrow L, Fig. I, the inlet-valves *a a* will admit the air or gases to the interior of the cylinder. At the end of the outward stroke these valves *a a* will gently close by means of the springs *d d*. At the return stroke of the piston, and after the pressure of the compressed air or gases has become sufficiently strong to overcome the resistance of the spring *b*, and whatever resistance there may be resulting from the pressure in the receiver into which the air or gases may be forced, acting on the back side of the outlet-valve D, the valve D will open and permit the compressed gases to escape, and, as shown in Fig. III, the piston C will travel beyond the end of the cylinder, taking the valve D upon and with itself by reason of the yielding of the spring *b*, thus discharging the entire contents of the cylinder. At the return stroke of the piston the valve D will follow it back to its seat, and an immediate vacuum will be produced as the piston leaves the valve, which vacuum will again be supplied through the valves *a a*, as above described.

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

The eduction-valve D, arranged to yield and operate substantially as described, in combination with a piston, C, and cylinder, F.

THOMAS DOANE.

Witnesses:

C. W. LUNT,

CHAS. S. LINCOLN.