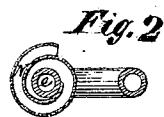
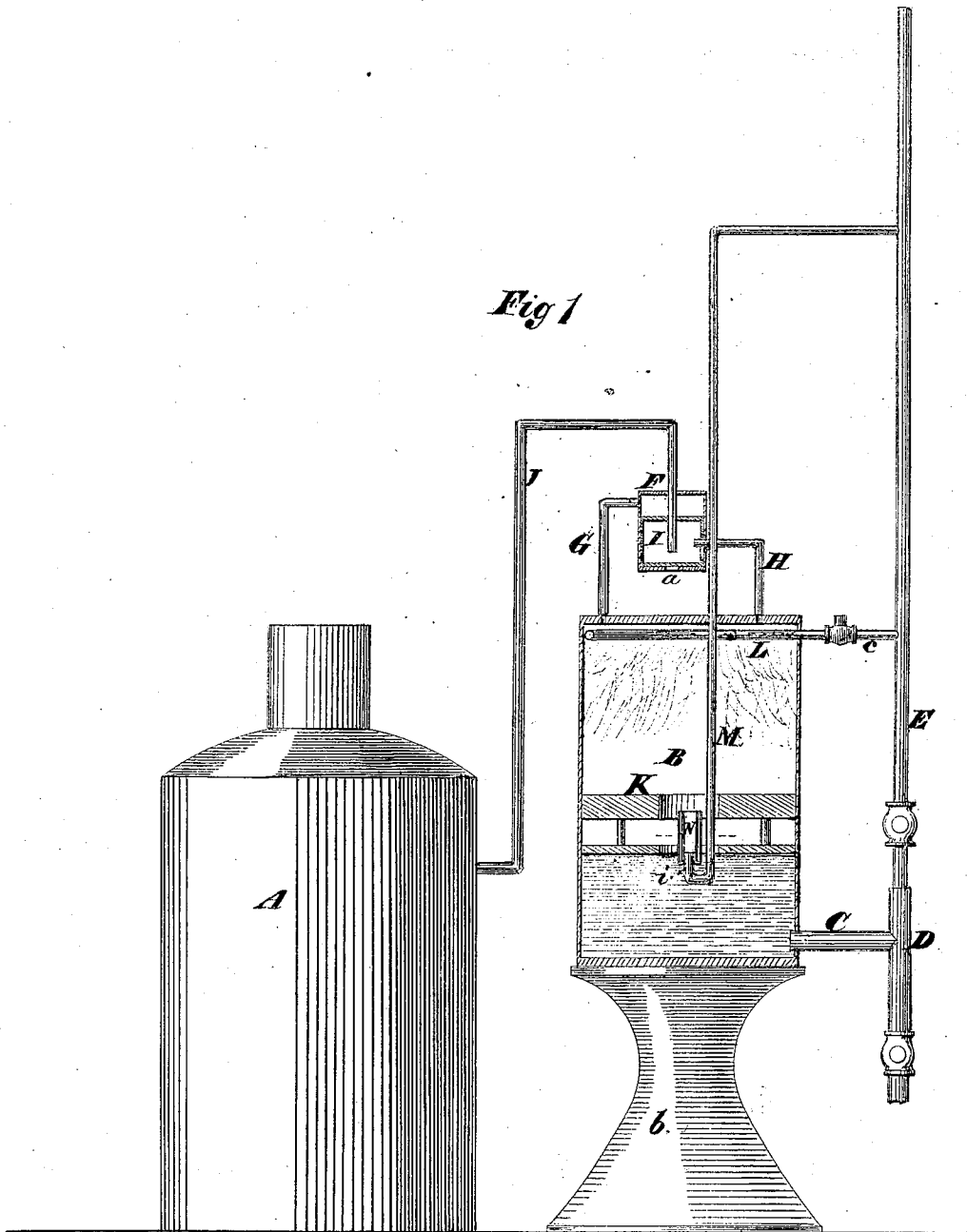


I. P. TICE.
Steam Vacuum-Pumps.

No. 136,344.

Patented Feb. 25, 1873.



WITNESSES:

Arthur D. Kerr.
James E. Smith.

INVENTOR:

Isaac P. Tice

UNITED STATES PATENT OFFICE.

ISAAC P. TICE, OF NEW YORK, N. Y.

IMPROVEMENT IN STEAM VACUUM-PUMPS.

Specification forming part of Letters Patent No. 136,344, dated February 25, 1873.

To all whom it may concern:

Be it known that I, ISAAC P. TICE, of the city, county, and State of New York, have invented an Improved Apparatus for Raising and Forcing Water by the Condensation and Pressure of Steam, of which the following is a specification:

This invention relates to that class of apparatus for raising and forcing water in which a vacuum is formed by the condensation of steam in a suitable chamber, and water raised into said vacuum by atmospheric pressure is subsequently expelled by the pressure of steam, and afterward condensed to form a vacuum for the repetition of the operation. The invention consists in the construction and arrangement of the steam-valve of such apparatus and its passages and appurtenances whereby the operation of the valve is effected by the alternate action of atmospheric pressure and the pressure of the steam. It also consists in the combination with the outlet-pipe of a pipe leading from the lower portion of the chamber to the outlet-pipe some distance above the top of the chamber, and a perforated coil arranged in the top portion of the chamber and connected with the outlet-pipe, whereby, at the completion of the stroke, water from the outlet-pipe flows back through the coil, and is sprayed into the chamber, and condenses the steam therein and forms a vacuum.

In the accompanying drawing, Figure 1 is a central vertical section of an apparatus made according to my invention, and Fig. 2 is a horizontal section of the water-cut-off pipe on a larger scale than Fig. 1.

A is a steam-generator, which is or may be of ordinary construction. B is a chamber, of cylindrical form, which is supported on a stand, *b*. Said chamber has arranged within it a loose float, K, consisting of two plates of suitable material, secured together at a short distance apart to contain water between them. They separate the steam in the upper part of the chamber from the cold water in the lower part. A perforated coil, L, is situated in the top portion of the chamber, and communicates by a branch, *c*, with the outlet-pipe, said check-valve being capable of being opened only toward the chamber. It communicates with an inlet-pipe, D, furnished with a check-valve opening toward the chamber, and an outlet-pipe, E, like-

wise furnished with a check-valve closing toward the chamber, and has arranged at a short distance above it a valve-cylinder, F, having a hole, *a*, in its bottom open to the atmosphere, and having leading to its upper portion from the top of the chamber B a pipe, G. H is another pipe, whose upper end projects through the side of the valve-cylinder into a valve, I, which slides vertically within the valve-cylinder, and is slotted to move past the end of the pipe H. In the bottom of the valve-cylinder there is the hole or opening *a*. A pipe, J, from a steam-generator leads to the interior of the valve, its end being opposite the bottom of said valve. M is what I term the cut-off pipe, which extends into the bottom part of the chamber, and is bent at the end to form a short arm, *i*, parallel with the main portion of the pipe. Surrounding the end portion of this is a scroll of sheet metal, which coils outward from the pipe, and is closed at the bottom; but in the latter there is a small hole, *e*, open to the pipe below.

The apparatus operates as follows: The chamber is first filled with water by any convenient means, and then steam is admitted to it. Acting on the water or on the float K, which is resting on the surface, it expels the greater portion of the water out through the branch *c* into the outlet E, opening the check-valve in the latter, and while the greater portion of the water thus passes out through *c*, and thence up the outlet-pipe E, a certain quantity is forced out through the cut-off pipe M into the outlet-pipe. As soon as the lower plate of the float comes opposite the edge of the arm of the cut-off pipe, which is situated at the lowest point to which the chamber is ever intended to discharge, steam enters the pipe, and at its junction with the outlet-pipe cuts the water therein; and that portion below the cut-off pipe flows down the outlet-pipe into the coil, and is sprayed into the upper portion of the chamber, and thereby condenses the steam therein and forms a vacuum, into which water flows through the branch *c* from the inlet-pipe by atmospheric pressure. During the descent of the water, that which is contained in the float, and is, of course, heated by steam above it, forms an insulator between the steam above and water below it, and so hot water can never enter the outlet-

pipe; and also on the refilling of the chamber, and rising of the float, a warm surface is presented to the steam, and the condensation of the latter is thereby greatly lessened.

The object of the scroll is to prevent the incoming water from entering the cut-off pipe before the steam, and thereby checking the flow of condensing-water to the chamber.

What I claim as my invention is—

1. In an apparatus of the character herein described, a valve constructed and arranged relatively to the chamber and connected substantially as herein described, whereby, on the completion of the discharge of the chamber, the valve is closed by the pressure of the atmosphere, and reopened by its own weight and the pressure of steam.

2. The combination of the vertically-sliding valve I, its cylinder F, perforated at one end for the admission of the atmosphere, steam-pipe J, and pipes H and G, substantially as and for the purpose herein set forth.

3. The cut-off pipe M, in combination with the vessel B, and the main outlet-pipe E, and the perforated coil or condensing-pipe L, substantially as described, for operation as set forth.

4. The combination of the scroll N with the cut-off pipe M, as shown and described.

ISAAC P. TICE.

Witnesses:

ARTHUR D. KERR,
SYDNEY E. SMITH.