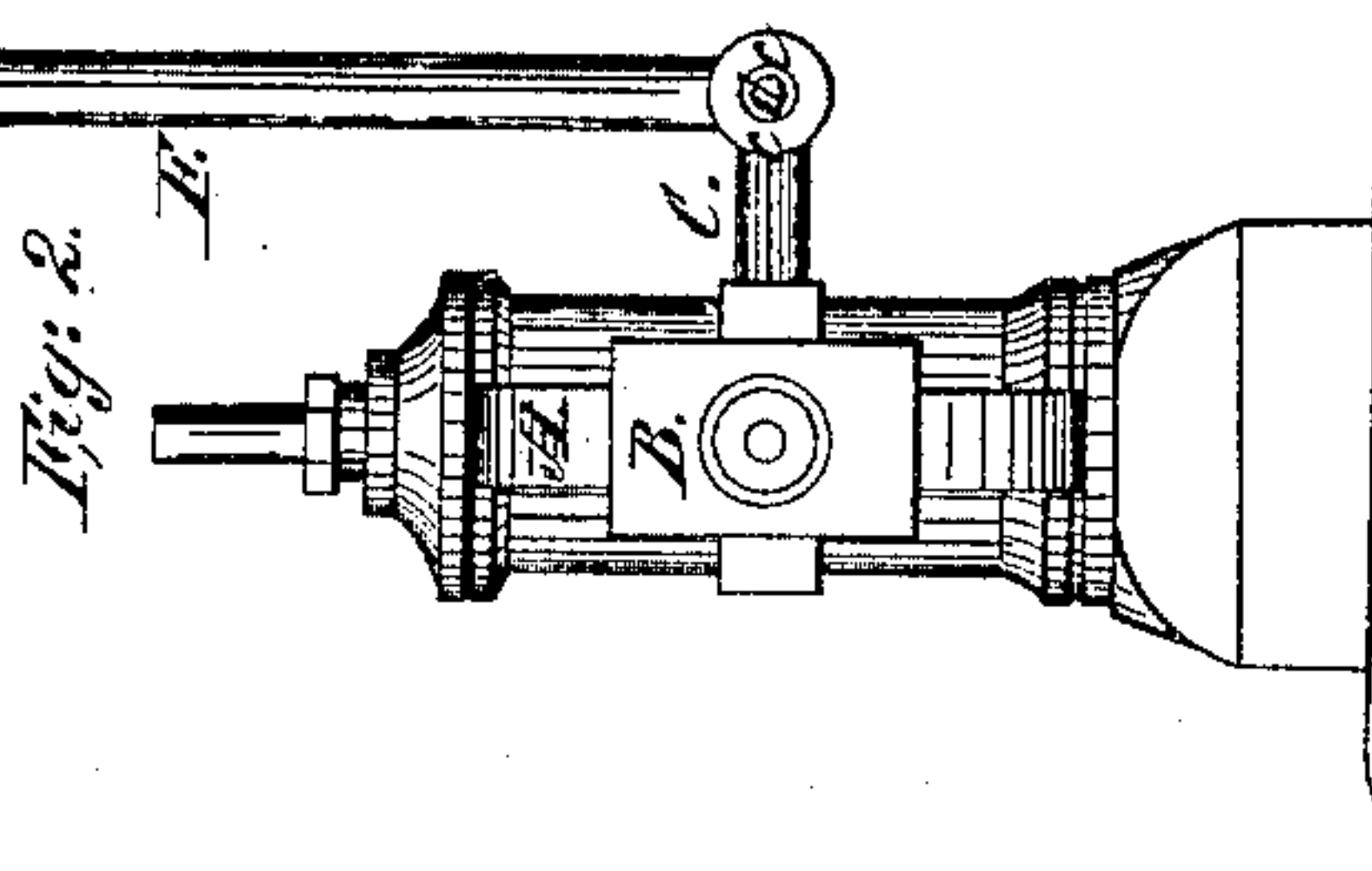
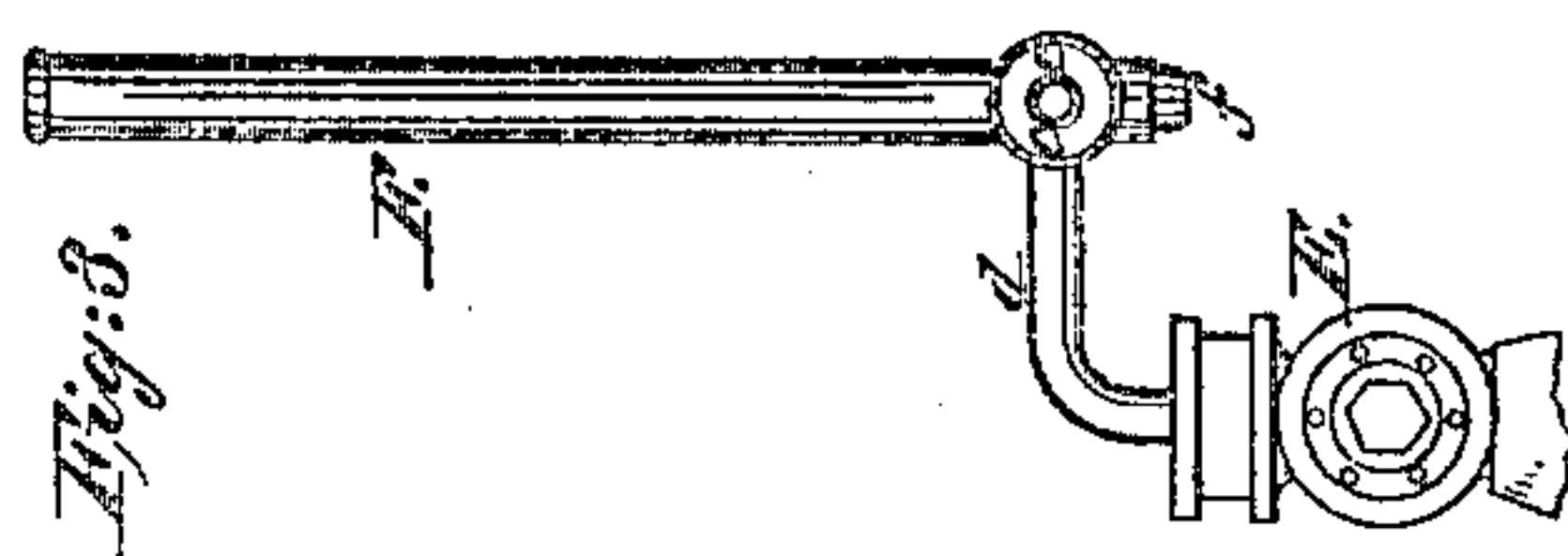
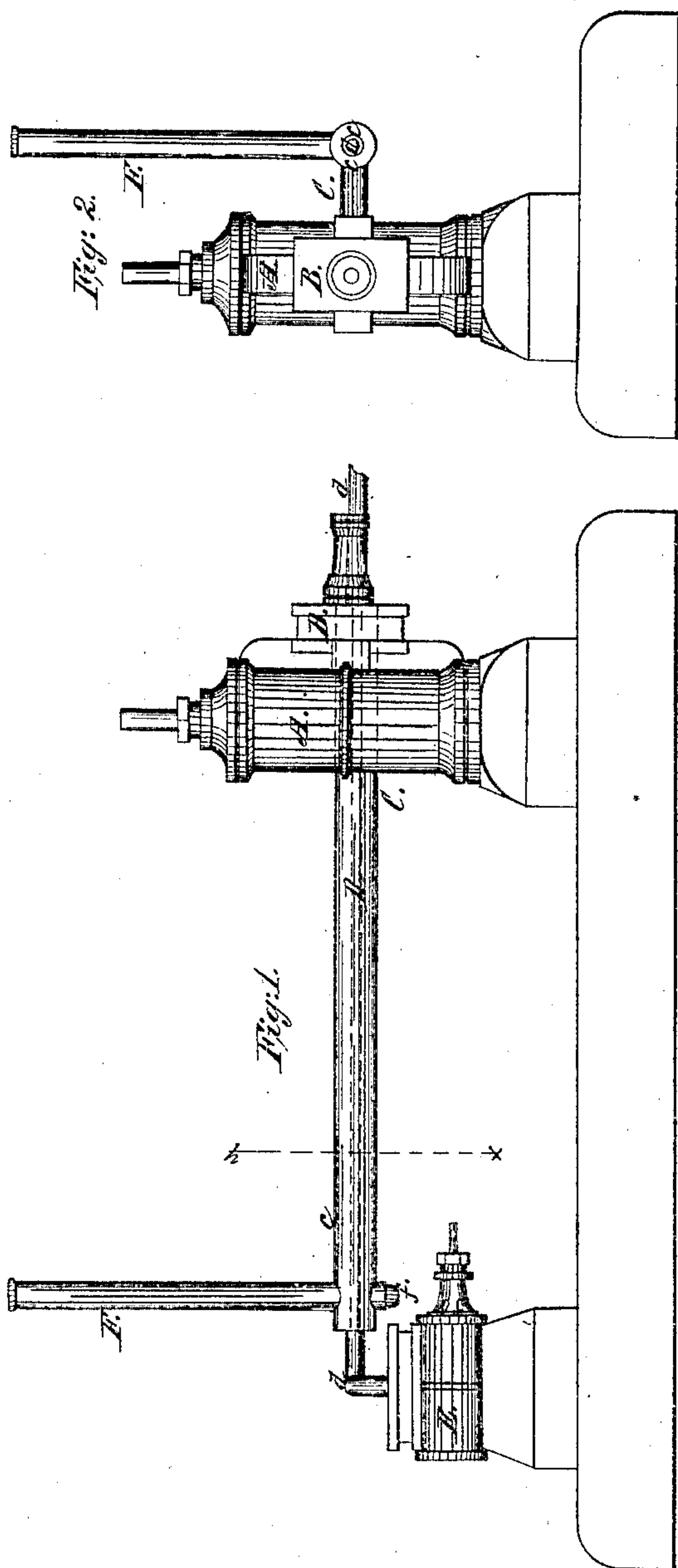


S. ANDREWS, Jr.
STEAM ENGINE.

No. 44,846.

Patented Nov. 1, 1864.



Witnesses:
James G. Clark
J. D. Clarke.

Inventor:
Solomon Andrews, Jr.

UNITED STATES PATENT OFFICE.

SOL. ANDREWS, JR., OF WESTFIELD, NEW YORK

IMPROVEMENT IN STEAM-ENGINES.

Specification forming part of Letters Patent No. 44,846, dated November 1, 1864.

To all whom it may concern:

Be it known that I, SOL. ANDREWS, JR., of Westfield, in the county of Richmond, Staten Island, and State of New York, have invented a new and Improved Method of Increasing the Power of a Steam-Engine; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

The nature of my invention consists in the return of caloric to the boiler or engine by means of atmospheric air and the use of the same as an auxiliary to that of steam, using the air in an expanded state in combination with steam at a low temperature. For this purpose I employ an air-pump worked by the same engine or a smaller one to force in the atmospheric air, heated by the exhaust-steam on its passage to the boiler or engine.

To enable those skilled in the art to construct and use my invention, I proceed to describe the construction and operation of the same, reference being had to the accompanying drawings, making a part of this specification, of which—

Figure 1 represents a side elevation; Fig. 2, an end elevation; Fig. 3, a sectional elevation, as indicated by the red line *x y*.

Like letters indicate like parts in all figures of the drawings.

A represents the cylinder of an ordinary steam-engine; B, the steam-chest, and a portion of the steam-pipe leading from the boiler.

C represents that portion of the exhaust-pipe which receives the steam from the cylinder after it has worked the piston, conveying it to the longer or main portion of the same *c c*, forming a steam jacket or covering for the air-pipe D (shown by the dotted lines) within the exhaust-pipe and the extremities of the same *d d*, one end of which receives cold air from the air-pump E, conveying it through the entire length of the exhaust-pipe to the steam boiler or engine, as described.

F represents the perpendicular portion or exit of the exhaust-pipe at its remote extremity.

f is a short pipe or aperture on the lower side and farthest extremity of the exhaust-pipe, to allow an exit for the escape of water, the product of the condensed steam.

E is an ordinary air-pump, either single or

double action, sufficiently well understood as not to require further description.

Briefly, I would describe my invention as that of a simple pipe or tube conveying atmospheric air from an air-pump worked by the engine and passing through the exhaust-pipe of the same, or its equivalent, thereby becoming heated and expanded by the steam on its passage through the exhaust-pipe to the boiler or engine. The hot air entering the same, serving as a medium through which the caloric contained in the exhaust-steam is immediately restored to the motive power, thus economizing fuel, and the expanded air acting as an auxiliary to the steam, and combining with it, increasing the power and adding to the water or steam that portion of air (or, as some engineers consider, oxygen) originally contained in the water, and removed therefrom by the ordinary process of evaporation, a continual supply of fresh air to the water or steam thus being kept up.

I have thus described a single air-pipe in the exhaust-pipe, but there may be several surrounded by one steam-jacket, or the air may be conveyed within the jacket around one or more steam-pipes, in order to enlarge the surface of condensation and allow of a slower motion to the passage of the air, in order to take up more caloric from the exhaust-steam.

It will be observed that the water which issues from the exhaust-pipe is pure distilled water, and may be collected for drinking or other purposes, it having been condensed by atmospheric air, and not by the admixture of cold salt-water, as in marine low-pressure engines. It will probably also contain the necessary amount of air to make it palatable. A hose may be attached to the exhaust-pipe to convey it to the water casks or tanks below deck, to keep them always filled.

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

1. The return of caloric from the exhaust-steam to the steam or water spaces of a steam-boiler, or steam and water passages of steam-engines, by means of atmospheric air.

2. Forcing air into the steam or water spaces of a steam-boiler, or steam and water passages of steam-engines, by means of an air pump, in combination with the air-tube and exhaust-pipe, substantially as set forth.

3. The heating of air on its passage from the pump to the steam or water spaces of a steam-boiler, or steam and water passages of steam-engines, by the waste heat of the exhaust-steam.

4. The construction and arrangement of the parts hereinbefore described for the purpose of increasing the power of a steam-engine and the saving of fuel, and the production of

fresh water from salt-water for drinking or other purposes in the working of a marine engine, without additional expense for such purpose or loss of power to the engine.

SOL. ANDREWS, JR.

Witnesses:

J. T. CLARKE,

RANDOLPH COYLE, Jr.