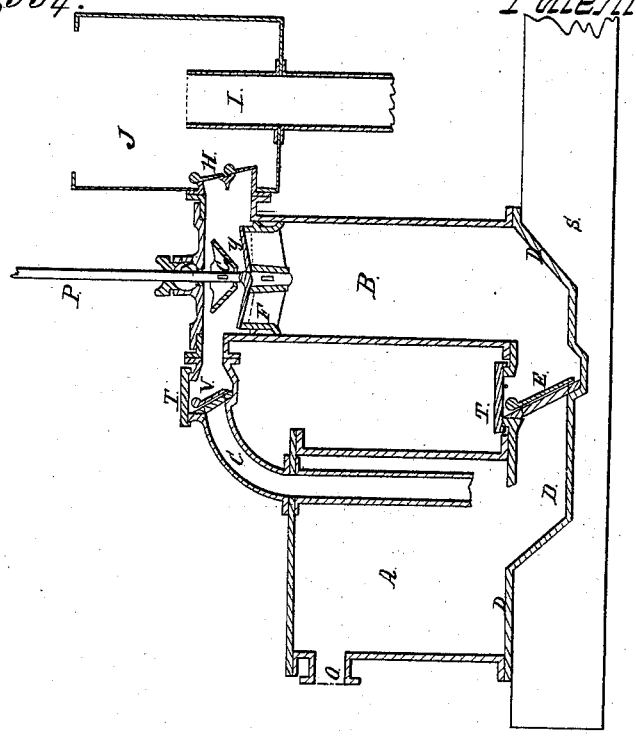
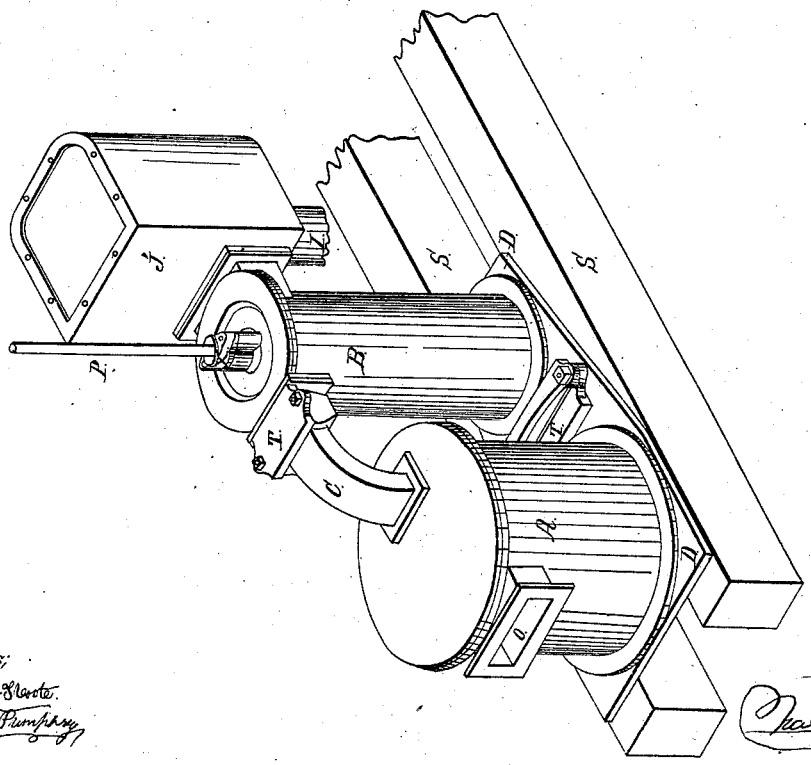
C. Reeder,

Steam-Boiler Condenser.

No. 3,334. Patented Nov. 15, 1843.





Witnesses;
Chas. Steele.
John F. Plumpley

Inventor:
Chas. Reeder

UNITED STATES PATENT OFFICE.

CHARLES REEDER, OF BALTIMORE, MARYLAND.

AIR-PUMP USED IN LOW-PRESSURE OR CONDENSING STEAM-ENGINES.

Specification of Letters Patent No. 3,334, dated November 15, 1843.

To all whom it may concern:

Be it known that I, CHARLES REEDER, engineer, of the city of Baltimore, in the State of Maryland, have made certain new and useful Improvements in the Manner of Constructing the Air-Pumps Used in Low-Pressure or Condensing Steam-Engines, by means of which improvements said air-pump is made to operate more efficiently, in proportion to the power expended, than either the double or single acting air-pumps previously in use; and I do hereby declare that the following is a full and exact description thereof.

Figure 1, in the accompanying drawings, is a perspective view of my improved pump, and its immediate appendages; and Fig. 2, is a vertical section of the same in the plane of the axes of the air-pump and condenser; in each of these figures the same parts are designated by the same letters of reference.

A, is the condenser, which is a cylindrical, or other formed, vessel of cast-iron.

B, is the air-pump, the upper part of which is connected with the condenser by means of the air-pipe, C. The condenser and air-pump both rest on the cast-iron plate, or seat, D, D.

S, S, are sills which are represented as placed under the plate D.

Between the condenser and the air-pump, at their lower ends, is a foot valve E, which opens toward the air-pump, as represented; and in the upper part of the air-pipe, C, there is an air valve V, also opening toward the air-pump.

T, T, are the bonnets which cover these valves.

F, is the piston, or bucket, of the air-pump, furnished with butterfly valves, as shown at Y, which are regulated in their rise by the guards, G. The piston rod P, and the stuffing box, X, are formed and arranged in the ordinary manner.

O, is the opening for admitting the steam from the engine into the condenser. H, the discharge valves through which the air and water are to pass from the air-pump into the discharge box, J; I, a discharge tube for the escape of water from the said box.

It will be readily seen by every competent machinist that there is not anything new in either of the parts above described, when taken individually; but it will be found upon a careful examination of the manner in which these parts are arranged, and combined with each other, that a new, and very useful, effect is thereby produced. The piston, or bucket, of the air-pump is made on the same plan with that of the ordinary single-acting air-pump, but in its operation it will be found that my pump is double-acting. The cylinder of this pump I make from five to six tenths the diameter of the steam, or main, cylinder of the engine, and it has one half the length of the stroke. This length and diameter may, of course, be varied, provided this is done without changing the ratio which the capacity of the air-pump bears to that of the main cylinder. Between the top of the piston, F, and the cap of the pump, there is a water space, the content of which is not to be discharged.

The operation of this improved pump is as follows. The piston on its ascent, forms a vacuum below it, in the usual way, and the water, with a portion of the air and vapor, will pass from the condenser, as in the common double, or single, acting pump. On the descent of the piston, a partial vacuum will be immediately formed above it, as its valves will be kept closed, not by their own gravity, merely, but by the pressure of the portion of water above them, which, from the arrangement of the parts, was not discharged in the upward stroke. This will consequently produce a partial vacuum above the piston, and the air and vapor in the condenser will consequently open the valve V, and will pass into the upper end of the pump cylinder. The valve V, it will be seen, is situated, like that of the ordinary double-acting air-pump; that is to say, as near to the upper part of the structure as possible. When the piston, in its descent, is brought into contact with the water contained in the lower part of the pump, the valves in the piston will open with unusual ease, in consequence of there being a partial vacuum in the cylinder above them; as the piston again ascends, the water which has passed above its valves, will, in part, condense the vapor above it, and the air and water will be forced through the discharge valves H, in the same manner as in the common single-acting air-pump. The pump thus operating, not only discharges the air and water, but it becomes itself an actual condenser, at each stroke of its piston, and condenses a large portion of the steam thereby admitted into it.

The advantages of this manner of construction and operation are, in part, as follows. It is less in its proportionate diameter than the ordinary air-pump, which is equal to seven tenths of that of the main cylinder, while mine need not, as herein stated, be more than five, or between five and six, tenths of such diameter; from this circumstance alone, there is less loss by friction than in the ordinary pump; it produces an equal vacuum above and below its piston, both in itself and in the condenser, at each stroke, which the common single-acting pump cannot effect. By having a valved piston, or bucket, it is entirely free from the most serious objection to the solid piston of the double-acting pump, the latter in its descent striking the water with a force nearly, or quite, equal to that due to its collision with a solid body, and producing a concussion equally unpleasant and injurious, sometimes breaking the valves, or bonnets. The water is discharged, also, with much greater ease in my pump than it possibly can be in the down stroke of the double-acting pump, the foot valve of which has to open against the pressure of a very considerable column of water.

Having thus fully described the nature of my improvements in the air-pump for condensing steam engines, what I claim therein as new, and desire to secure by Letters Patent, is—

The manner herein set forth of arranging the valves of the pump and condenser, and of connecting and combining them with each other, so as to render the said pump double-acting, while its piston is provided with valves, as in the common single-acting air-pump; that is to say, I claim the arrangement of the air-pipe C, with its valve, V, opening into a water space between the upper side of the piston, F, and the head of the cylinder, in combination with the valved piston, the foot valve, E, and the discharge valves, H; by which arrangement and combination the apparatus is made to operate as herein set forth.

I have already stated that I do not claim either of the individual parts as new, and I, consequently, limit my claim to the combination as a whole, but without intending to limit myself to any particular form of the respective parts, but to extend it, under all variations of form, to every combination which is substantially the same in its manner of action, and in the result produced.

CHAS. REEDER.

Witnesses:
THOS. P. JONES,
B. K. MORSELL.