A. Hartupee,

Compound Steam Engine.

No. 45,603. Patented Dec. 27, 1864.

Fig. 1.

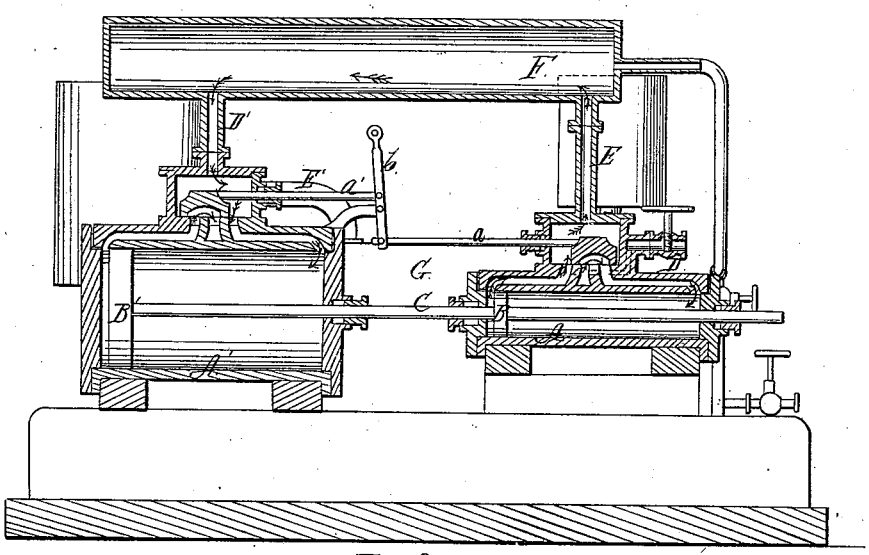
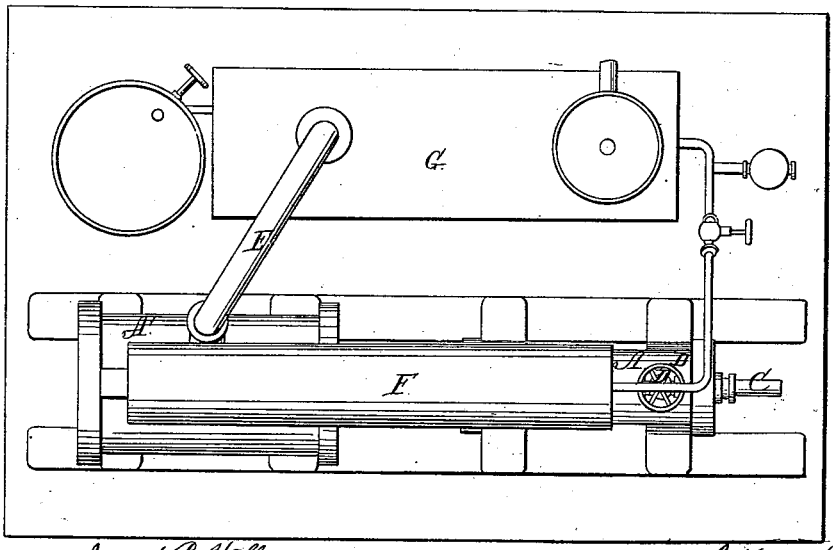


Fig. 2.



Witnesses: James P. Hall
Henry Morris

Inventor: A. Hartupee
per Munn & Co
Attorneys

UNITED STATES PATENT OFFICE.

A. HARTUPEE, OF PITTSBURG, PENNSYLVANIA.

IMPROVEMENT IN STEAM-ENGINES.

Specification forming part of Letters Patent No. **45,603**, dated December 27, 1864.

To all whom it may concern:

Be it known that I, A. HARTUPEE, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and Improved Steam-Engine; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable those skilled in the art to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 represents a longitudinal vertical section of our invention. Fig. 2 is a plan or top view of the same.

Similar letters of reference indicate corresponding parts.

The object of this invention is an engine in which steam is used at a very high pressure (say one hundred and thirty-five to one hundred and sixty pounds to the square inch) in a small cylinder exhausting into a receiver of sufficient capacity for the steam to expand, thereby decreasing the back-pressure and allowing the temperature and pressure of the steam to fall to the proper degree to be used in a large cylinder working at low pressure and exhausting into a condenser in which the steam is finally condensed.

A represents an ordinary steam-cylinder, provided with a piston, B. The piston-rod C of this piston extends through both heads of the cylinder and through the head of the large cylinder A′, connecting with the piston B′, which is fitted in said large cylinder in the ordinary manner. The bore of the large cylinder is two or more times as large as that of the small cylinder, and each cylinder is proviced with a separate steam chest and slide-valve. The small cylinder A receives steam of a very high pressure (say from one hundred and thirty-five to one hundred and sixty or more pounds to the square inch) through the supply-pipe D, and it exhausts through the pipe E into the receiver F. The large cylinder takes steam through the pipe D′ from the receiver and it exhausts through the pipe E′ into the condenser G. The valve-rods *a a′* of the two cylinders are connected by an oscillating lever, *b*, to which motion is imparted from the rock-shaft, or in any other convenient manner, or each valve may be connected to the rock-shaft or to an eccentric independent of the other, or said valves may be operated in any convenient manner.

The steam as it exhausts from the small cylinder into the receiver F will expand and thereby the back-pressure on the piston of the small cylinder is materially reduced. At the same time the temperature and pressure of the steam falls to the proper degree to render said steam available in the large cylinder. By this arrangement the chief difficulty heretofore existing with engines of a similar construction has been obviated.

When high-pressure steam is first introduced into a small cylinder and allowed to exhaust from the same directly into a large cylinder in which it will expand sufficiently to render its condensation practicable at certain parts of the stroke, the action of the steam entering the large cylinder is so violent as to dislocate all the parts, besides affording only an intermittent application of power, which causes the engine to work irregularly. This difficulty is obviated by the receiver F, which I have interposed between the two cylinders. By its action the steam exhausting from the small cylinder is allowed to expand, and its effect on the large piston is moderated, and for that reason I have called said receiver a "moderator."

The capacity of my moderator ought to be about four times as large as that of the small cylinder when working steam at one hundred and fifty pounds to the square inch, but I vary its size according to the point of cutting off, always proportioning it so as to obtain in it the pressure best adapted for working the large cylinder at low pressure with condensation.

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

The receiver or moderator F, applied in combination with the high and the low pressure steam-cylinders A and A′, when the pistons are attached to a common piston-rod, C, and the induction and eduction valves operated from a common rock-shaft, and all arranged substantially as described.

A. HARTUPEE.

Witnesses:
H. P. GENGEMBRE,
S. MORROW.