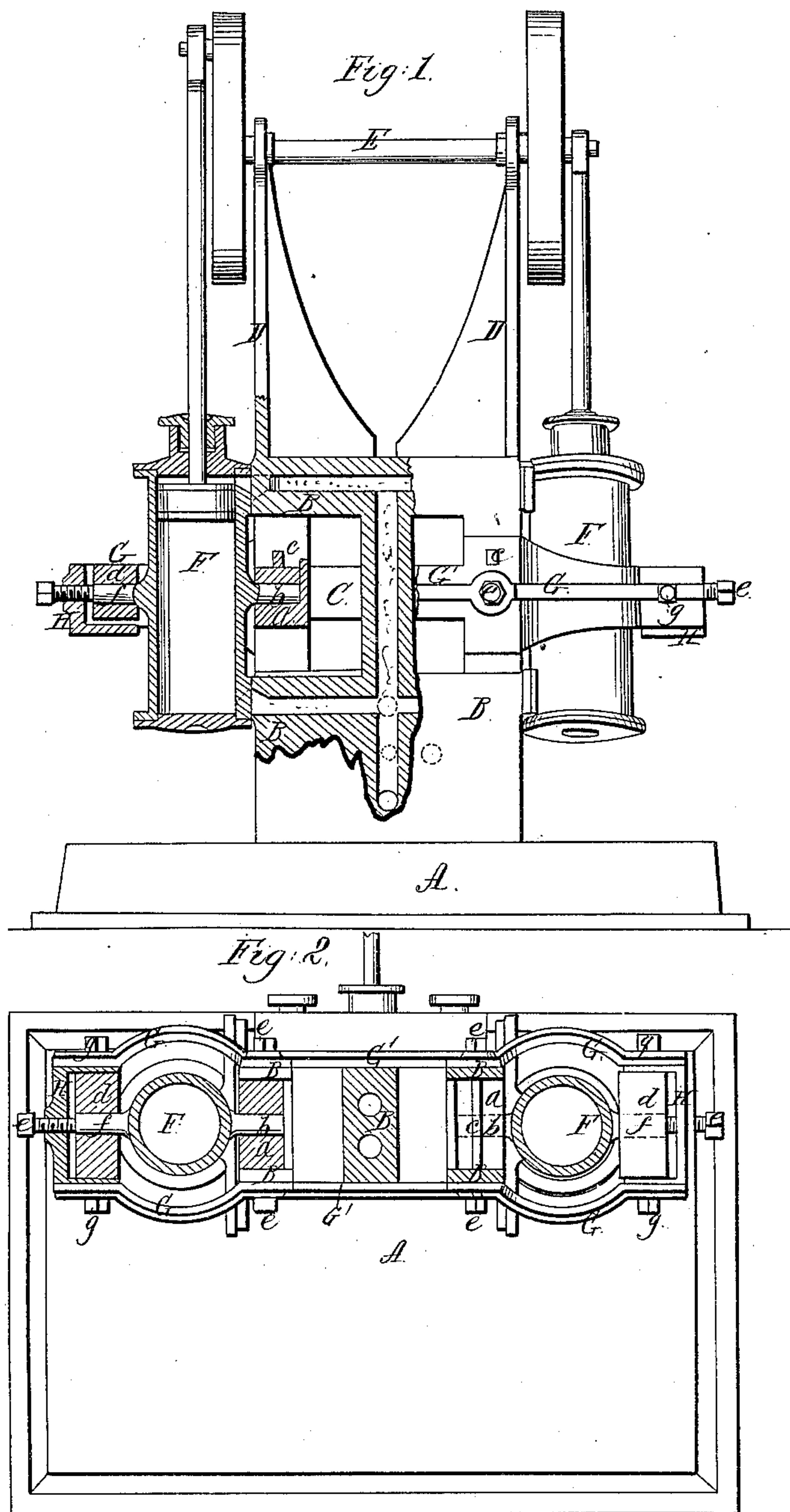


*C. R. Otis,*  
*Oscillating Steam Engine.*  
*N<sup>o</sup> 30,240.                      Patented Oct. 2, 1860.*



*Witnesses:*  
*J. H. Cooke*  
*E. H. Cowtan*

*Inventor:*  
*Charles R. Otis*

# UNITED STATES PATENT OFFICE.

CHARLES R. OTIS, OF YONKERS, NEW YORK.

## IMPROVEMENT IN OSCILLATING ENGINES.

Specification forming part of Letters Patent No. 30,240, dated October 2, 1860.

*To all whom it may concern:*

Be it known that I, CHARLES R. OTIS, of Yonkers, in the county of Westchester and State of New York, have invented a new and useful Improvement in Oscillating Steam-Engines; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is an elevation, partly in section, of a double engine with my improvement. Fig. 2 is a horizontal section of the same.

Similar letters of reference indicate corresponding parts in both figures.

My invention relates to oscillating engines in which the main framing or a portion of it constitutes the steam-chest.

My invention consists in a certain mode of supporting the trunnion-bearing of the opposite side of the cylinder to that on which the steam-chest is situated, whereby the proper line of the axis of oscillation is preserved, notwithstanding the variable expansion of the steam-chest and main framing.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

A is the bed-plate of the engine.

B is a steam-chest in the form of a quadrangular box of cast-iron, having formed in it by coring two sets of passages—viz., one set for the induction of the steam from a valve-chest C to the cylinder and the other set for its eduction from the latter. This system of passages, however, needs no description as it constitutes no part of my invention.

The steam-chest B may be considered the principal portion of the framing of the engine, as it supports the two standards D D, in which are the bearings of the main shaft E, and also supports the bearings *a a* for one trunnion *b* of each of the two cylinders F F. The caps of these bearings *a a* are held down by means of keys *c c*, driven through portions of the steam-chest, but not passing through any of the passages.

The cylinders and steam-chest are fitted together with working-faces in which are ports through which the induction and eduction of the steam to and from the cylinder at the proper times are effected by the oscillating motion of the cylinders themselves.

G G G G are strong arms bolted to the front and back of the steam-chest C and projecting beyond the sides thereof in front of and behind the cylinders for the purpose of supporting the boxes H H, containing the bearings *d d* of the outer trunnions *f f*. These arms may be made separate, but I prefer to make them in pairs, as shown in Fig. 2, the two front ones, one for each cylinder, being made of a single casting, and the two back ones, one for each cylinder, being made of a single casting, as by this construction they can be better secured to the steam-chest by the bolts *e e* employed for the purpose.

G' G' represent the portions of the castings connecting the arms. The boxes *d d* are secured between the arms G G by bolts *g g*, but may be secured to the arms in any convenient manner.

*h h* are set-screws screwing through the boxes *d d* and pressing against the ends of the trunnions *f f* for the purpose of confining the cylinders against the sides of the steam-chest and preserving tight working-joints between their working-faces. By this mode of supporting the bearings of the outer trunnions from the steam-chest it is obvious that as the steam-chest by expansion and contraction raises and lowers the bearings of the inner trunnions, which are supported directly upon it, the outer bearings of the trunnions must be raised and lowered in a precisely-corresponding manner, and hence the line of the axis of the trunnions is always kept perfectly parallel with the axis of the main shaft.

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

The employment, in combination with a steam-chest arranged at one side of the cylinder of an oscillating engine and having the bearing of one trunnion resting upon it, of two arms G G, secured to the said chest for the purpose of supporting the opposite trunnion also from the steam-chest, substantially as herein described, for the purpose set forth.

CHARLES R. OTIS.

Witnesses:

J. H. COOKE,  
C. W. COWSAN.