

A. HARTUPEE.
Improvement in Compound Engines.
No. 125,812. Patented April 16, 1872.

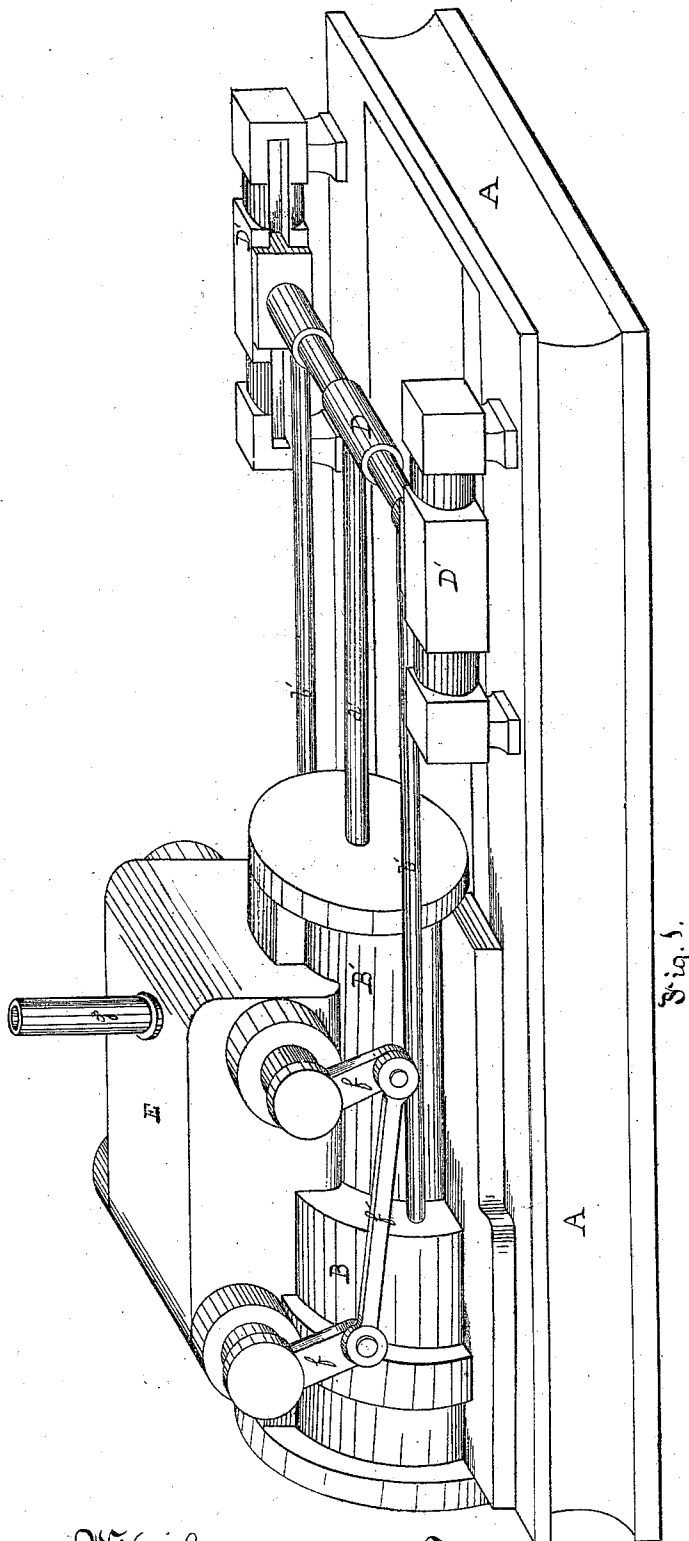


Fig. 1.

Witnesses:

R. W. Marshall
Geo. W. Kern

Inventor:

Andrew Hartupée,
by Bakewell, Christy & Kerr
his Attys.

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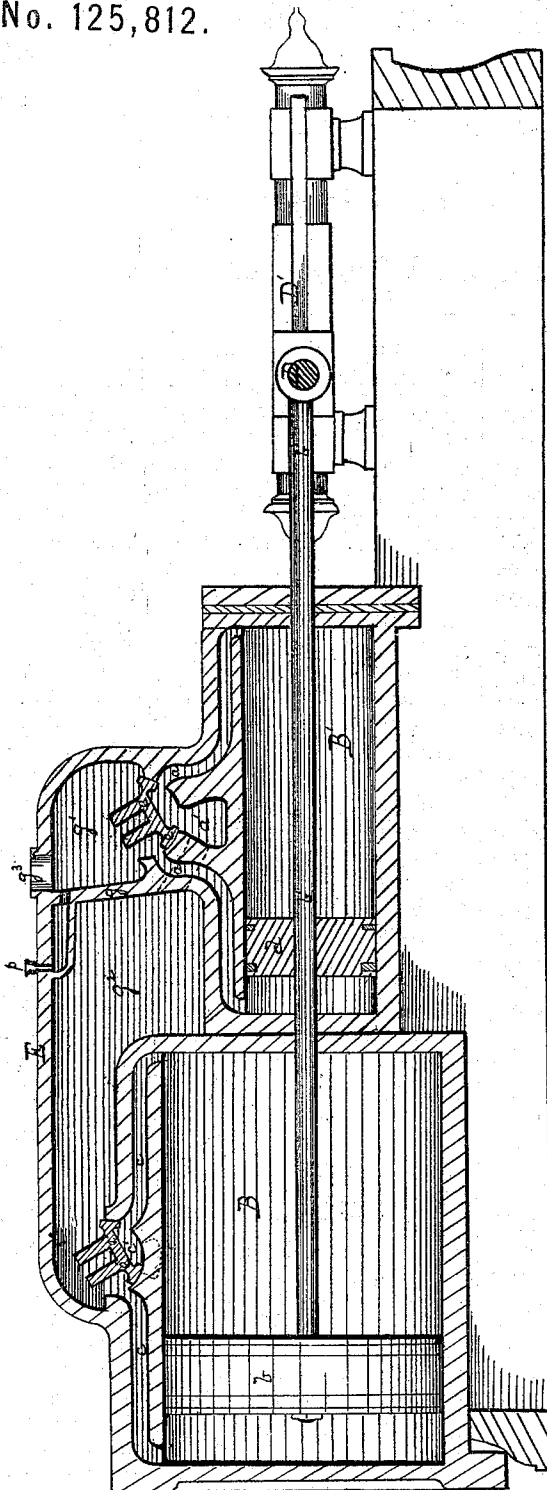


Fig. 2.

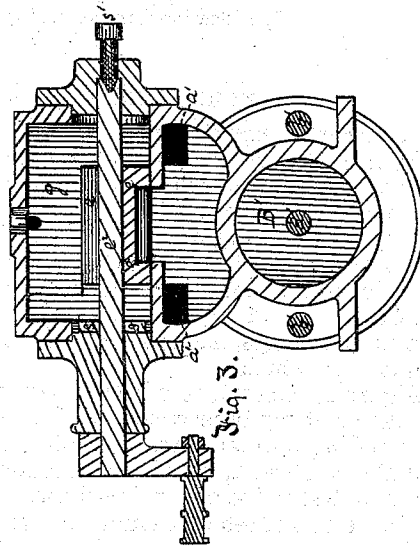


Fig. 3.

Witnesses:
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J. W. Kern

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UNITED STATES PATENT OFFICE.

ANDREW HARTUPEE, OF PITTSBURG, PENNSYLVANIA.

IMPROVEMENT IN COMPOUND ENGINES.

Specification forming part of Letters Patent No. 125,812, dated April 16, 1872.

SPECIFICATION.

To all whom it may concern:

Be it known that I, ANDREW HARTUPEE, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Steam-Engines; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawing, in two sheets, making a part of this specification, in which—

Figure 1, Sheet 1, is a perspective view illustrative of my improvement. Fig. 2, Sheet 2, is a longitudinal vertical section thereof; and Fig. 3, Sheet 2, is a vertical sectional view through first valve and valve-chest.

Like letters of reference indicate like parts in each.

My improvement relates to that class of double-cylinder steam-engines in which the steam, after having been used in one cylinder, is exhausted therefrom into another; the two cylinders being so arranged and fitted up with such valves and ports that the pistons of both cylinders shall move in the same direction at the same time. The invention consists in the features of construction and combination hereinafter set forth and claimed.

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

On any suitable bed, foundation, or frame, A, rest the larger and smaller cylinders B B'. Both have the same axial line. They are provided with the usual pistons *b d*, and from these pistons the stems *b' d'* lead to a common cross-head, D, which operates in the usual manner in the grooved slides D'. The cylinders have the usual arrangement of steam-ports *a a c c* and exhaust-ports *a' c'*. These ports terminate at their outer ends in a seat having the form of the segment of a cylinder, as shown in Fig. 2, and on each of these seats is a rotary or oscillating valve, *e e'*. These valves are mounted on stems *e''*, and the stems have at their outer ends a crank and link connection, *f f'*, such that they shall receive a simultaneous throw in either direction. Covering both valves is a box or case, E, called a moderator. It is divided by a diaphragm, *g*, into two steam-chests, *g¹ g²*. Steam is admit-

ted by any suitable pipe, *g³*, from the steam-generator into the steam-chest *g¹*, and passes thence alternately through the ports *a* to the cylinder B', so as to give to the piston *d* the desired motion. The exhaust steam passes alternately from the opposite ends of the cylinder back through the ports *a*, under the valve *e*, into the exhaust-port *a'*, which leads, as indicated by dotted lines in Fig. 2, from the ends of the steam-chest *g¹* outside the left-hand port *a*, to the other part of the moderator E, or into the steam-chest *g²*. From this it passes, by the ports *c c*, alternately to the opposite ends of the cylinder B, and, having done its work, escapes at the exhaust *c'* in the usual manner. An oil-cup is attached at *p* or other suitable point.

With this arrangement of valves, ports, and valve-connections (the throw of the valves being secured in any suitable way) it will be seen that steam is admitted from each valve-chest to the same side of the piston in each cylinder at the same time, so that its power will be simultaneously exerted in both to give a single motion to the cross-head D, and that the steam in this operation is used twice—first in the smaller cylinder B' and then in the larger cylinder B; also, that, while the live steam is free to pass through the ports *a a* into the smaller cylinder, it is, by the diaphragm *g*, prevented from entering the other steam-chest, except as exhaust steam, from the smaller cylinder.

Fig. 3 illustrates another feature of my invention. The valve *e* is affixed to a stem, *e''*, as already indicated. To avoid the necessity of using stuffing-boxes on the bearings of this stem where they ordinarily pass through the ends of the steam-chest, I fix a packing-collar, *s*, on the stem at such point that, when the valve is in proper position, the side or face of the collar will bear against the end of the steam-chest and pack the bearing of the stem at that point. The other end of the stem *e''* does not project through the steam-chest, but has a centering seat or recess in its end, (or an equivalent centering device,) in which works the centering set-screw *s'*. By this means not only is the stem *e''* kept accurately in the center, but, also, the packing-collar *s* is held with any desired pressure against the face of the valve-chest, and as either wears

away it can be set over, so as always to make a steam-tight joint without the expense of a stuffing-box or the necessity of frequent re-packing.

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

1. A diaphragm, *g*, arranged in the moderator *E* to divide it into two steam-chests and keep the live steam from entering the exhaust-chest *g*², except through the cylinder *B*, substantially as described.

2. The packing-collar *s* on the stem *c*² inside the steam-chest, in combination with a suitable

ble centering and adjusting device at the opposite end of the stem, for the purposes set forth.

3. The arrangement of the moderator *E*, valve-crank *f*, and link *f'*, substantially as set forth.

In testimony whereof I, the said ANDREW HARTUPEE, have hereunto set my hand.

ANDREW HARTUPEE.

Witnesses:

A. S. NICHOLSON,
G. H. CHRISTY.