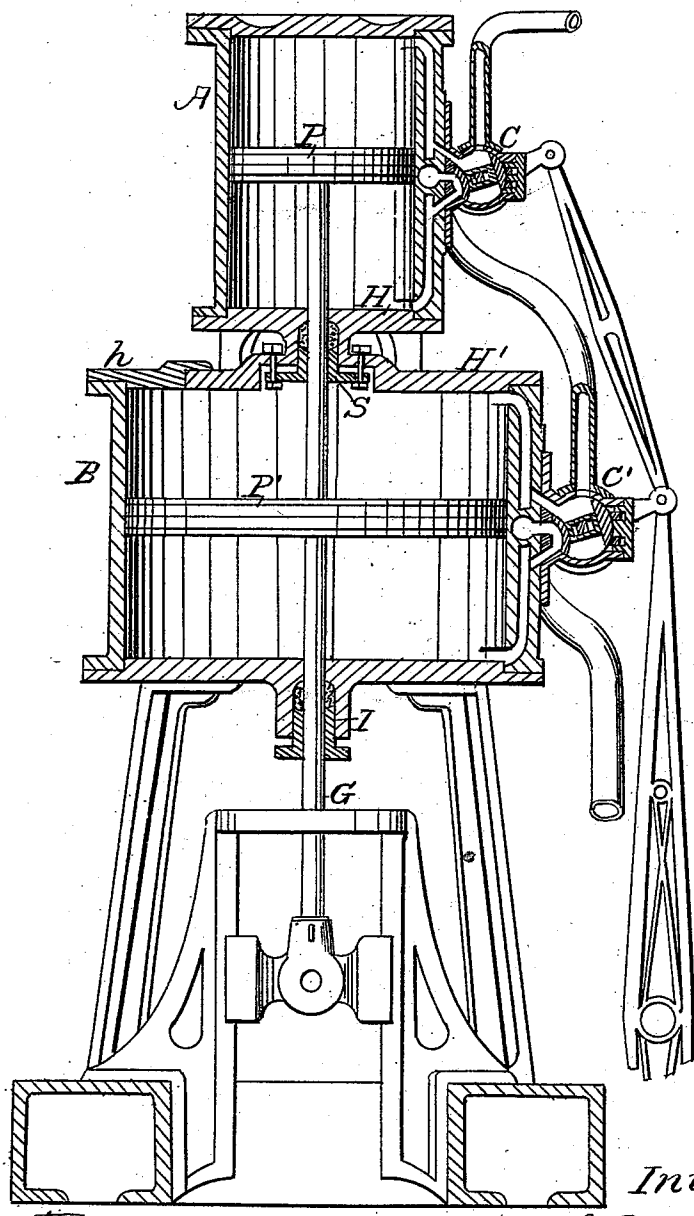
F. S. Pease,

Compound Steam Engine.

No. 82,437. Patented Sep. 22, 1868.

Fig. 1.



Witnesses:

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By Knights Bros. Attys

United States Patent Office.

FRANCIS S. PEASE, OF BUFFALO, NEW YORK.

Letters Patent No. 82,437, *dated September* 22, 1868.

IMPROVEMENT IN RECIPROCATING STEAM-ENGINES.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that I, FRANCIS S. PEASE, of Buffalo, in the county of Erie, and State of New York, have invented certain new and useful Improvements 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 drawings, which are made a part of this specification.

My invention relates primarily to that class of steam-engines which are provided with a high-pressure and a low-pressure cylinder, arranged end to end and coincident in axis, their pistons being attached to one and the same rod, and the steam being first used at high pressure and then exhausted into the low-pressure cylinder, but a part of my invention is applicable also to other descriptions of engines.

My improvements consist—

First, in such a construction and combination of the intermediate heads of the respective cylinders that a single stuffing-box will suffice to pack the piston-rod in both said heads.

Second, in the construction of the head of the larger or low-pressure cylinder in two or more parts or sections, as hereinafter described, to afford access to the interior of the cylinder.

Third, in the arrangement of the stuffing-box in the interior of the large cylinder, as hereinafter described.

The drawing represents a vertical longitudinal section of a compound engine, illustrating my invention.

A is the direct-steam-engine cylinder, placed above the cylinder B, into which latter the steam of the smaller cylinder A is exhausted, and in which it is expanded. The steam is admitted to the steam-chest C of the smaller cylinder, and exhausts into the steam-chest C′ of the lower or larger cylinder.

G is the piston-rod, to which both pistons, P and P′, are connected, so as to move together. As the steam-valves work in unison, the exhaust is admitted either to the bottom or top of the larger cylinder B at the same time and direction that the steam is admitted into the corresponding end of the smaller cylinder A. The final exhaust is from the steam-chest C′ of the lower or larger cylinder into the condenser. The proportion well calculated to work successfully is to have the direct-steam or smaller cylinder one-half the diameter of the expansion or larger cylinder. An important point is to have them as close together as possible. To this end, I make the middle casting H H′ answer for the two cylinder-heads. It is easily made in one piece, or in two pieces, and bolted firmly together. This construction of the combined cylinder-heads saves great cost over any other now in use. A small space is left between the two heads, to allow the bolts to be got at, which connect with the stuffing-box inside of the cylinder.

The lower or larger cylinder-head H′ is made in two or more pieces, so that the smaller piece *h′* can be easily removed to get inside to adjust the packing-rings or fix the stuffing-box.

But one stuffing-box is required in the connection between the two cylinders, and that is placed in the inside of the lower or larger cylinder-head H. No steam can escape into the atmosphere, and the steam acting on the box S tends to make it tight. The bolts that hold the stuffing-box pass through the cylinder-head. This arrangement makes a close, compact, compound engine. The two cylinders being close together, there is but little loss to the power of the exhaust.

I is the ordinary stuffing-box.

Each of the steam-chests C C′ contains an oscillating balanced valve, V, which is moved by a shaft, E, made of oblong or other rectangular form where it passes through the valve, and occupying an elongated mortise or slot in the valve, leaving a space, *v v*, on each side of the shaft, so that the valve can always find a perfect fit to the valve-seat. The back of the valve turns or moves against the oblong metallic packing L, which fits steam-tight in the opening through the back of the steam-chest.

K is the cover. Small steam-holes admit the steam to the back of the packing to press it against the valve, and keep the face of the valve steam-tight to the valve-seat. The surfaces of this valve V, being about equally exposed to the pressure of the steam, it is equalized in pressure and kept to its seat by the steam pressing on the metallic packing L. This packing is stationary.

The oscillation of the valve-shafts E may be effected by means of rods R R′, or any suitable mechanism, and the rod R, which connects the two valves, may be made variable in length, so as to adjust the valves to precise unison of action.

A hole being cut through the steam-chest, the stationary packing is readily inserted against the oscillating valve. It is very easy to get at from the outside, without removing the heads, by simply removing the cover or cap K, and it admits of very easy adjustment.

There is a small space left above the packings, as shown, *k k*, so that the steam may act on it.

The area of the oblong metallic packing is only required to be about two-thirds of the exposed area of the face of the valve, or sufficiently large to hold the valve to the seat.

My improved valve will be made the subject of a separate application for Letters Patent, but it is described here because it can be used with good advantage in my compound engine.

The following is what I claim as new, and desire to secure by Letters Patent:

1. The construction and arrangement of the frame, or covers, or cylinder-heads of the two cylinders, the lowest section or surface forming a cover to the cylinder B, and the upper surface the cover of cylinder A.

2. The combination of the lower cylinder-head H′ with the section *h*, whereby to gain access to the cylinder B, as herein set forth.

3. The arrangement of the stuffing-box inside the cylinder and with the cylinder-head, so that the bolts passing through the cylinder-head can be reached from the outside between the two heads.

4. The combination of the two cylinder-heads H H′, formed or connected together in the manner herein described, with sufficient space between them to give access to the bolts of the stuffing-box S.

FRANCIS S. PEASE.

Witnesses:

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