

J. Bradley,
Compound Steam Engine.
N^o 41,361. Patented Jan. 26, 1864.

Fig:1.

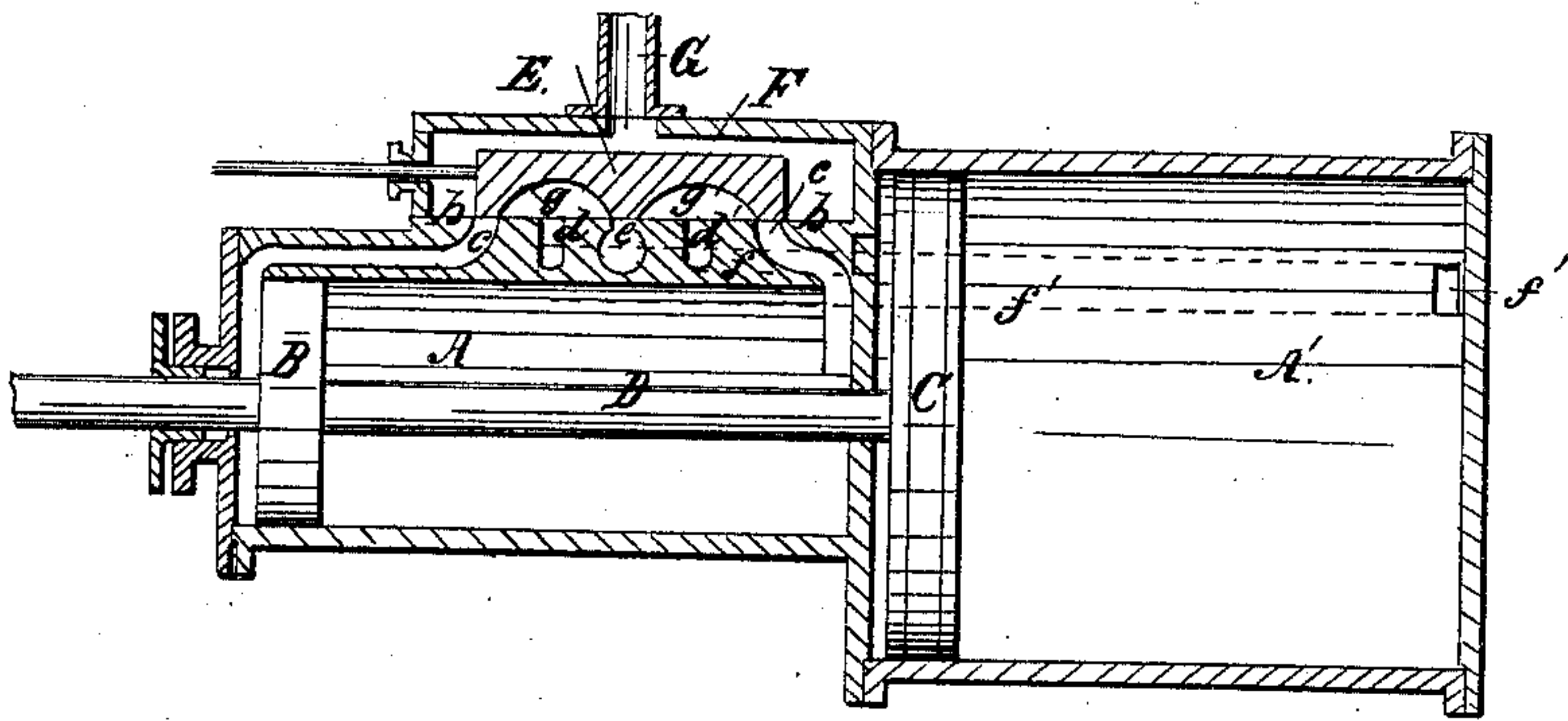
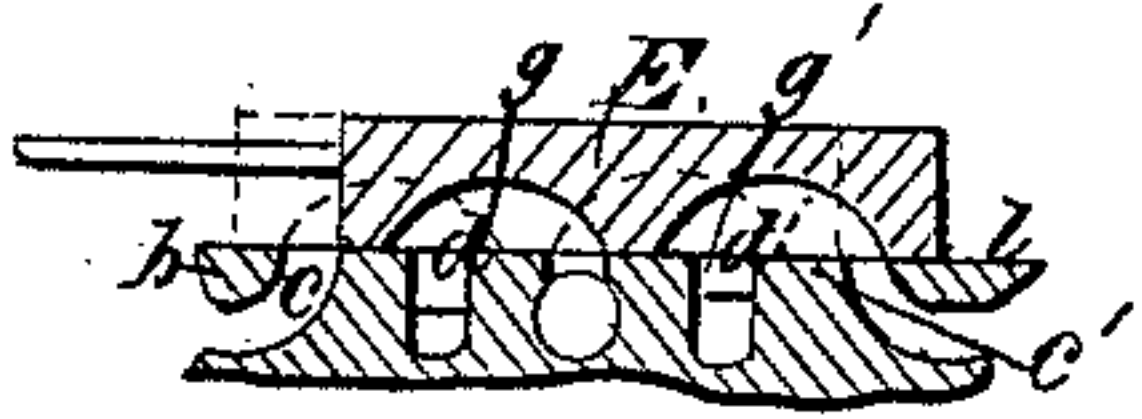


Fig: 2



Witnesses:

J. W. Coombs,

Glo Reed

Inventor:

per Wm L
Atty

UNITED STATES PATENT OFFICE.

JACOB BRADLEY, OF ST. MARY'S, OHIO.

IMPROVEMENT IN SLIDE-VALVES OF STEAM-ENGINES.

Specification forming part of Letters Patent No. 41,361, dated January 26, 1864.

To all whom it may concern:

Be it known that I, JACOB BRADLEY, of St Mary's, in the county of Auglaize and State of Ohio, have invented a new and useful Improvement in 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 a vertical longitudinal section of the cylinders and valve of an engine illustrating my invention. Fig. 2 is a longitudinal vertical section of the valve and seat, showing the valve in different positions.

Similar letters of reference indicate corresponding parts in both figures.

This invention relates to that class of steam-engines in which steam of a high pressure is first used in a cylinder of small diameter, and afterward at a lower pressure in a cylinder of larger diameter.

It consists in an improved slide-valve and system of ports for effecting the induction and eduction of steam to and from the two cylinders.

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 smaller and A' the larger cylinder, arranged end to end concentric with each other. B is the smaller and C the larger piston, fitted to their respective cylinders, and both attached to the same piston-rod D, which works in a stuffing-box in the partition *a*, between the two cylinders and another stuffing-box in the outer head of one of the cylinders. The connections of the piston-rod with the crank are not represented, as they may be of any well-known or suitable kind.

E is the slide-valve of the engine, by which the induction and eduction of the steam are effected, working upon a seat, *b*, in a steam-chest, F, which is arranged upon the smaller or high-pressure cylinder B, and which receives steam from the boiler by a pipe, G. In the seat *b* there are five ports, *c c' d d' e*, of which the central one, *e*, communicates with the exhaust or eduction pipe, which leads to the atmosphere or to a condenser, the two outer ones, *c c'*, at equal distances from *e* communicate with the smaller cylinder A, at opposite ends thereof, and the two, *d d'*, between *e* and *c c'*, communicate with the smaller cyl-

inder A, at opposite ends thereof, and the two, *d d'*, between *e* and *c c'* communicate by passages *f f'* with opposite ends of the larger or low-pressure cylinder A'. The spaces between the ports are of equal width. The slide-valve has two cavities, *g g'*, in its face, similar to the single cavity of the ordinary slide-valve used for a single cylinder. These cavities are each so constructed and arranged as to be capable of covering two of the ports and their intervening space, and that when the valve is at the middle of its stroke it will close the three ports *c c' e*, and its two cavities, *g g'*, will each cover one of the ports *d d'*, and the two spaces between the said ports and the ports *e* and *c* or *c'*, as shown in Fig. 1 of the drawings.

The valve is operated in substantially the same manner as the slide-valve of a single-cylinder engine, and the length of its stroke is such as to cause the ports *d d'* to be alternately brought by the cavities *g g'* of the valves first into communication with their respective ports *c c'*, and afterward into communication with the port *e*, one of the ports *c c'* being always open to the steam-chest when the other is open to its respective port *d* or *d'*, and one of the ports *d d'* being always open to the exhaust-port *e* when the other is open to the port *d* or *d'*. When the pistons are at either end of the stroke, the valve is nearly in the central position shown in Fig. 1, having only such "lead" as may be desired. When the pistons arrive at the left-hand end of their stroke, as shown in Fig. 1, the valve is moving toward the position shown in red outline in Fig. 2, and the port *c* commences opening to the steam-chest, the port *c'* to the port *d'*, and the port *d* to the port *e*, and steam is admitted from the steam-chest to the left-hand end of the high-pressure cylinder A, and from the right-hand end of that cylinder through the passage *f* to the left-hand end of the low-pressure cylinder, and exhausted from the right-hand end of the latter cylinder through the passage *f'* and ports *d* and *e*, and the piston then moves to the right. As the piston completes its movement to the right, the valve which is now moving toward the left closes the ports *c* to the steam-chest and *c'* to the low-pressure cylinder, and commences opening *c'* to the steam and *c* to the port *d*, which leads to the right-hand end of the low-

pressure cylinder, at the same time opening the port d' , which communicates with the left hand end of the low-pressure cylinder, to the exhaust-pipe, as shown in black outline in Fig. 2.

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

The slide-valve E, having two cavities, $g g'$,

in combination with the system of ports $c c' d d' e$, communicating with the high and low pressure cylinders, steam chest, and exhaust-pipe, substantially as herein specified.

JACOB BRADLEY.

Witnesses:

L. C. SAWYER,

IRA McLAIN.