HENRY W. ADAMS.

Improvement in Steam Engines.

No. 122,981. Patented Jan. 23, 1872.

Fig: 1.

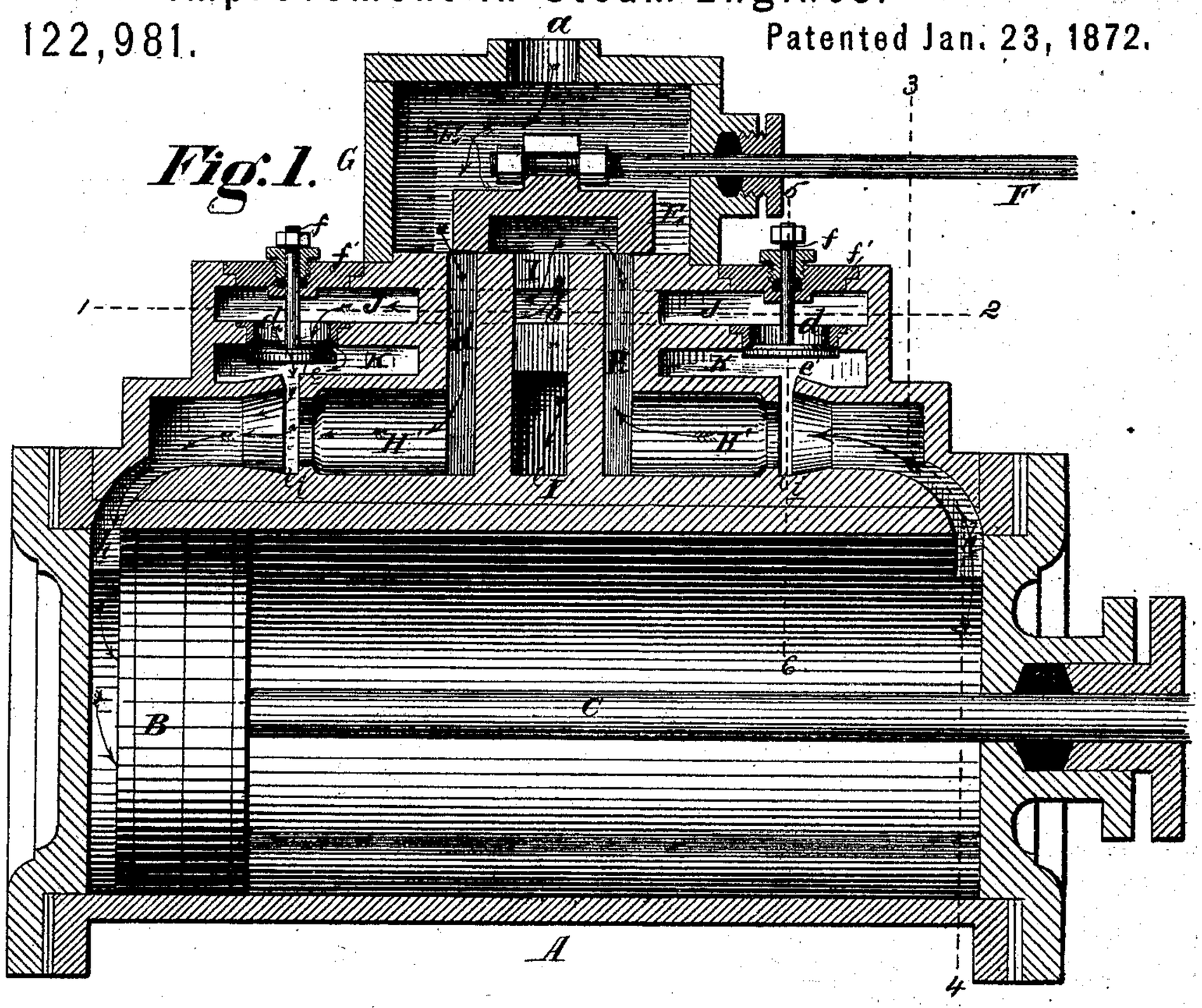


Fig: 2.

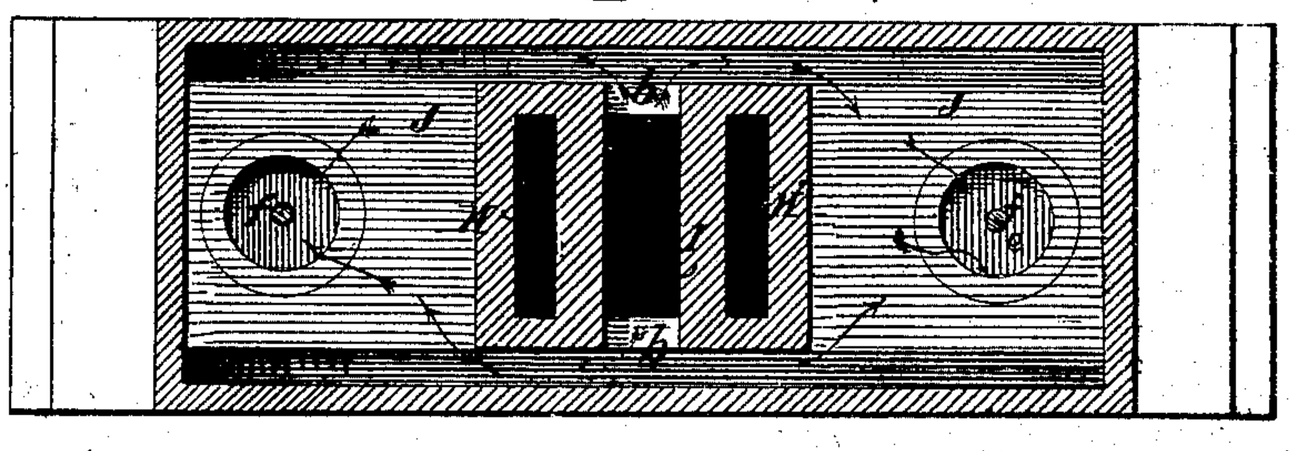


Fig: 3

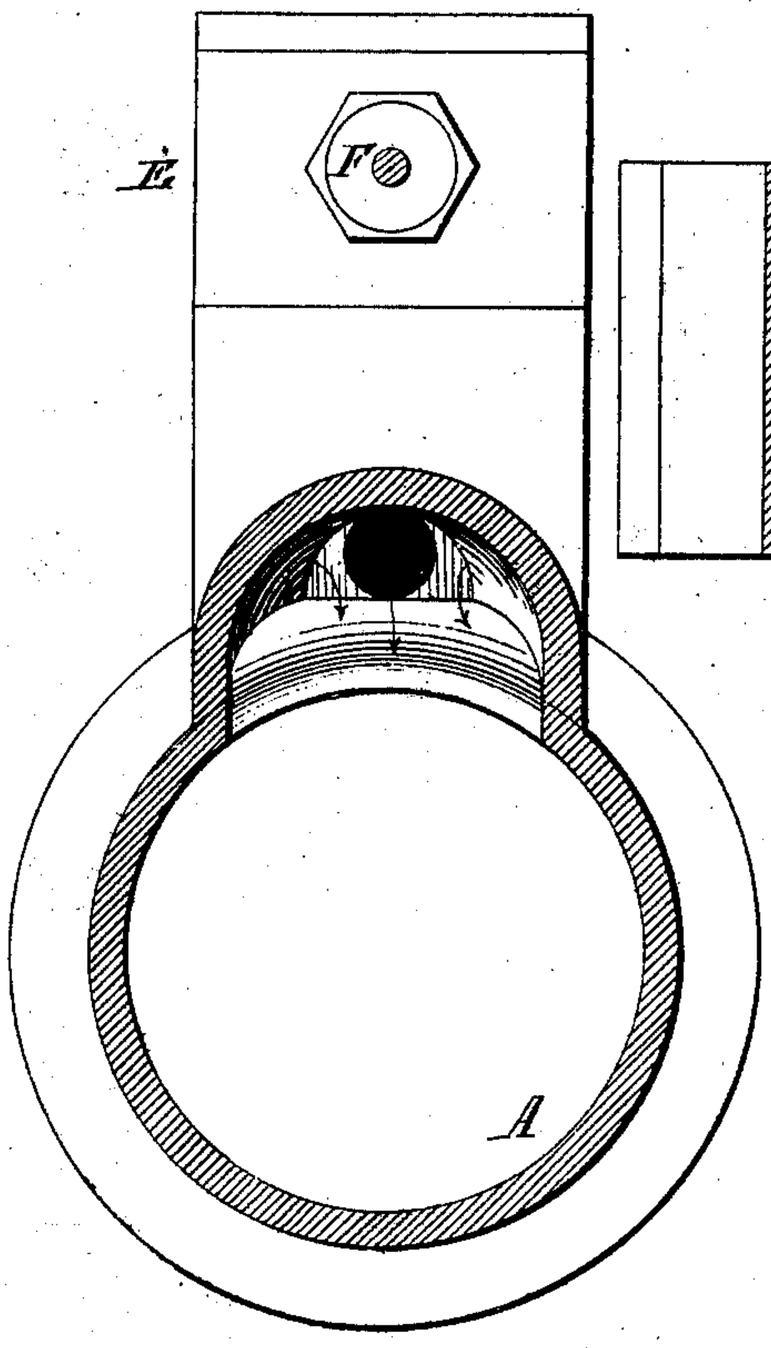
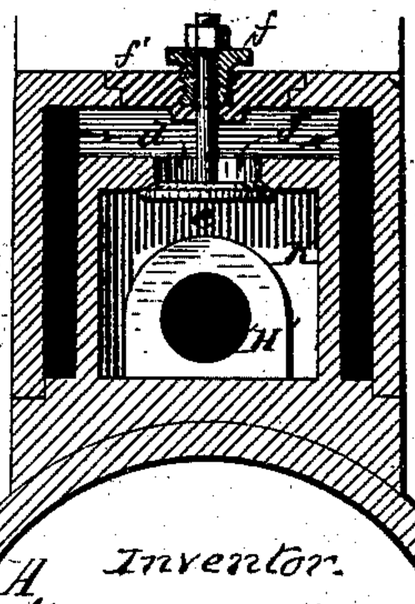


Fig: 4.



WITNESSES.

John Parker

Jno. B. Harding

Inventor.

Henry W. Adams

by his Attys.

Howson and Sons

Scale 2 in. - 1 Foot

122,981

UNITED STATES PATENT OFFICE.

HENRY W. ADAMS, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN STEAM-ENGINES.

Specification forming part of Letters Patent No. 122,981, dated January 23, 1872.

Specification describing an Improvement in Steam-Engines, invented by HENRY W. ADAMS, of Philadelphia, Pennsylvania.

Improvement in Steam-Engines.

My invention consists of a steam-engine in which a portion of the exhaust steam is introduced with the live steam into the cylinder, in a manner too fully explained hereafter to need preliminary description. My invention, which is an improvement on that for which Letters Patent were granted to me on the 27th day of June, 1871, has for its object economy in the use of steam by utilizing a portion of the exhaust steam.

In the accompanying drawing, Figure 1 is a vertical section of a steam-cylinder, valves, &c., illustrating my invention; Fig. 2, a sectional plan on the line 1 2, Fig. 1; Fig. 3, a vertical section on the line 3 4, Fig. 1; Fig. 4, a vertical section on the line 5 6, Fig. 1.

A is the cylinder of a horizontal steam-engine; B, the piston; and C, the piston-rod; E being an ordinary slide-valve connected to a valve-spindle, F, and operating within the chest G, to which live steam is admitted through an opening, *a*. H H are the two steam-ports, and I the exhaust port, the latter communicating with the external air through a passage, I′, as well as through a passage, *b*, with a chamber, J, which communicates with a lower chamber, K, through openings *d d*, each opening being furnished with a valve, *e*, and the spindle of each valve passing through a stuffing-box, *f*, on a cover, *f′*, which closes an opening in the top of the chamber J. Each steam-port H communicates through a circular passage, H′, and through a curved passage, *h*, with one end of the cylinder, and the continuity of each passage H′ is interrupted by a slot, *i*, which communicates with the chamber K, the passage being contracted on one side of this slot and slightly expanded on the opposite side, as shown in the drawing. By the operation of the slide-valve the steam is admitted first to one port, H, and then into the other port precisely as in ordinary steam-engines. The exhaust steam is also discharged in the usual manner into the port I, and thence through the passage I′ to the external air, or part of the exhaust steam will, under the circumstances described hereafter, pass from the port I into the chamber J. When the engine is working at its full power, as in the case of a locomotive ascending a steep grade or starting a heavy train, the valves *e e* will remain closed and the engine will operate in precisely the same manner as an ordinary engine, but when it is running at a high speed and the pressure of steam in the cylinder, owing to the momentum acquired by the piston, becomes less than that in the steam-chest, part of the exhaust steam will enter the steam-passage and will be re-enforced by the live steam and aid the latter in completing its duty. Supposing the piston, for instance, to have reached the limit of its rearward stroke, as shown in Fig. 1, the steam will begin to enter the port H to the left while it is exhausting through the steam-port to the right, and through the valve into the exhaust-port I. The steam as it rushes through the passage H′ will be interrupted to a limited extent by the contraction of the said passage and become a forcible jet, which, owing to its velocity across the slot *i*, will cause a partial vacuum in the chamber K, when the valve *e* above will descend and permit part of the exhaust steam which had been admitted through the passage *b* into the chamber J to pass from the latter into the chamber K, and thence through the slot *i* into the steam-passage H′, where it will unite with and be heated by the said live steam, and, entering the rear of the cylinder, assist the said live steam to force the piston forward. Precisely the same result takes place with the valve *e* to the right in Fig. 1 on the return stroke of the piston.

As extraordinary economy in the use of steam results from my invention it would be well to describe the experiments made with the view of determining this result.

My experimental engine had a cylinder thirteen inches in diameter, and had a stroke of twelve inches, the pressure of steam used being twenty-five (25) pounds per square inch. In the first instance the valves *e* were closed to their seats by turning the nuts of their spindles so that no exhaust steam could gain access to the passages H′, and such friction was applied to the fly-wheel that it made one hundred and thirty revolutions per minute. After

this the valves *e e* were set free to operate, and without altering the friction on the fly-wheel the latter made one hundred and eighty revolutions per minute. It was observed that the valve *e* on the left opened immediately after the commencement of the forward stroke of the piston, and did not close until the commencement of the return stroke, when the valve to the right opened. These experiments were repeatedly made with the same results.

I claim as my invention—

A steam-cylinder having passages H′ with slots *i*, through which exhaust steam can be admitted by the automatic action of valves operating substantially in the manner described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HENRY W. ADAMS.

Witnesses:

WM. A. STEEL,

HARRY SMITH.