Henry W. Adams,

Mode of Utilizing Exhaust Steam in Steam Engines.

FIG. 1.

PATENTED JUN 27 1871

116407

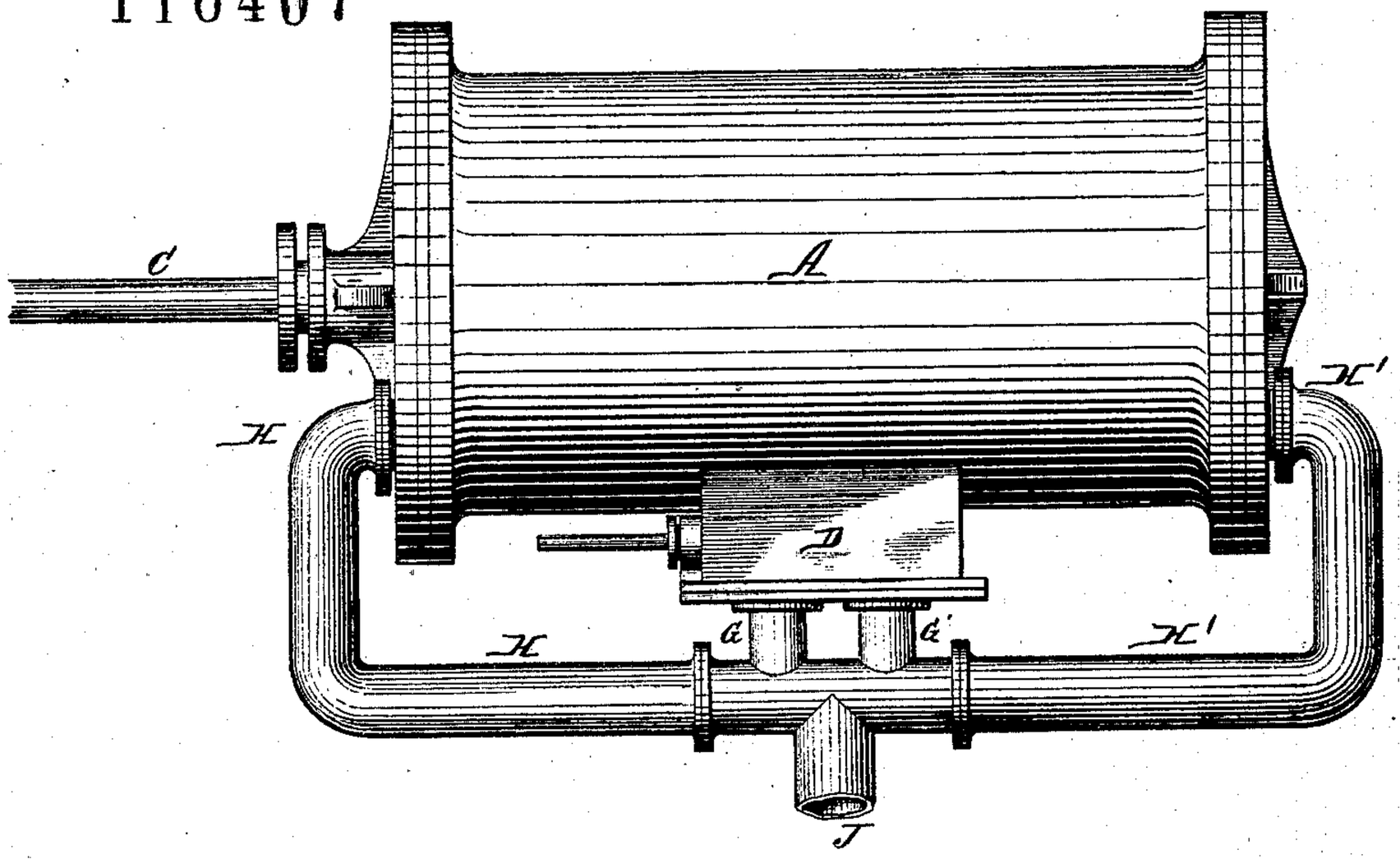
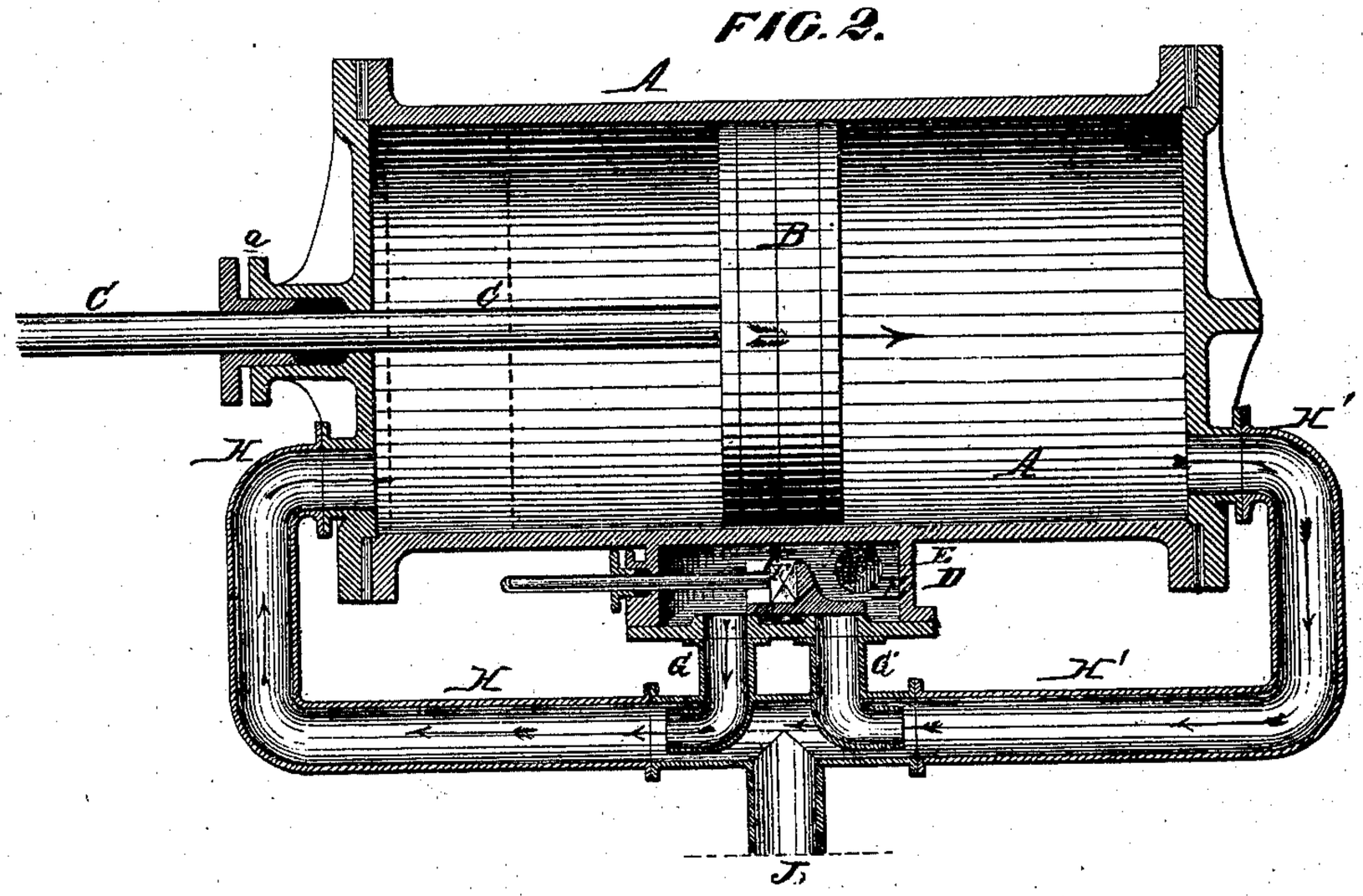


FIG. 2.



WITNESSES { Jno. B. Harding
John Parker

H. W. Adams
By his Attys
Howson & Sons

UNITED STATES PATENT OFFICE.

HENRY W. ADAMS, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN STEAM-ENGINES.

Specification forming part of Letters Patent No. 116,407, dated June 27, 1871.

To all whom it may concern:

Be it known that I, HENRY W. ADAMS, of Philadelphia, county of Philadelphia, State of Pennsylvania, have invented a Mode of Utilizing Exhaust Steam in Steam-Engines, of which the following is a specification:

My invention consists of a steam-engine, to the cylinder of which steam is admitted through open pipes or passages, substantially in the manner and for the purpose explained hereafter, the steam being exhausted through the same pipes or passages. My invention further consists in utilizing a portion of the exhaust steam from one side of the piston of a steam-cylinder by causing it to unite with a jet of live steam directed into the cylinder at the opposite side of this piston, substantially as described hereafter.

Figure 1 is a vertical section of a steam-cylinder and appliances whereby my invention may be carried into effect; Fig. 2, an exterior view of Fig. 1.

A represents a steam-cylinder, of which B is the piston and C is the piston-rod, passing through a stuffing-box, *a*, as usual, and connected to a crank on a driving-shaft, as in ordinary steam-engines. H and H′ are two pipes, both communicating with the interior of the cylinder, one pipe at one side of the piston and the other at the opposite side of the same, and the two pipes meeting at and communicating with the central pipe J. The nozzles G and G′ communicate with a steam-chest, D, to which live steam from any adjacent boiler is admitted, and in this chest is a valve, I, so operated from any working part of the engine that it will open and close the said nozzles G and G′ alternately. Any other valve mechanism which will accomplish this duty may be substituted for the valve I. The pipe J communicates directly with the external air, to which the interior of the cylinder is consequently open. Supposing the nozzle G to be open, or partially open, and the piston B to be at the termination of its forward stroke, as indicated by the dotted lines, a jet of steam escapes from the nozzle G into the pipe H, and, passing thence into the cylinder in front of the piston, will force the latter rearward in the direction of the arrow. The impetus of this forcible jet of the steam into the comparatively contracted interior of the pipe H is such at the point where it escapes from the nozzle, and exerts so much greater force at that point than is exerted on the piston, that the latter must yield without any interruption of the steam from the said nozzle. While the piston is being thus forced rearward the nozzle G is closed, and the steam at the rear of the piston is exhausting through the pipe H′ and passing through the annular space between that pipe and the end of the nozzle G′. A portion of this exhaust steam will, by the action of the jet of live steam escaping through the nozzle G, be drawn into the pipe H, and, uniting with the said jet, will be reheated thereby, and, re-enforcing the live steam, will aid the latter in forcing the piston to the termination of its rearward stroke. Whatever exhaust steam is not drawn into the pipe H by the action of the jet of steam from the nozzle G passes off into the air through the pipe J. The piston will return on closing the nozzle G′, when precisely the same action will take place, a jet of live steam passing through the latter nozzle into the pipe H′, and a portion of the exhaust steam from the pipe H uniting with the jet of live steam and being reheated by the latter, aiding in forcing the piston forward.

One of the advantages of admitting steam to and exhausting it from the cylinder through open pipes is that the latter always afford a free vent for the water of condensation which accumulates in the cylinder, and which is the source of frequent accidents in ordinary steam-engines. Another advantage of my invention is the free escape of the exhaust steam, owing to the action of the jet of live steam in line with the exhaust-pipe. This jet facilitates the withdrawal of the exhaust steam from one end of the cylinder while live steam is being admitted into the opposite end of the same. The ordinary cumbrous and power-absorbing valves of ordinary engines are dispensed with, light and simple valves for opening and closing the nozzles being alone required for directing the jets of steam to their proper course. In fact, the jets of steam themselves, directed alternately to opposite ends of the cylinder, perform the duty of valves.

The engine illustrated in the drawing affords but one of the modes of carrying my invention into effect. It will be evident to engineers that devices other than those described may be employed in connection with a steam-cylinder for

carrying out my invention, the character of the engine in many cases suggesting that of the valves and other appliances to be used.

I claim—

1. An engine, to the cylinder of which steam is admitted through an open pipe, substantially in the manner described.

2. A steam-cylinder, into the opposite ends of which alternately steam is admitted through pipes or passages which are open to the air, and through which the steam is exhausted, all substantially as set forth.

3. Utilizing a portion of the exhaust steam from one side of the piston of a steam-cylinder by causing it to unite with a jet of live steam directed into the cylinder at the opposite side of the piston, 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.