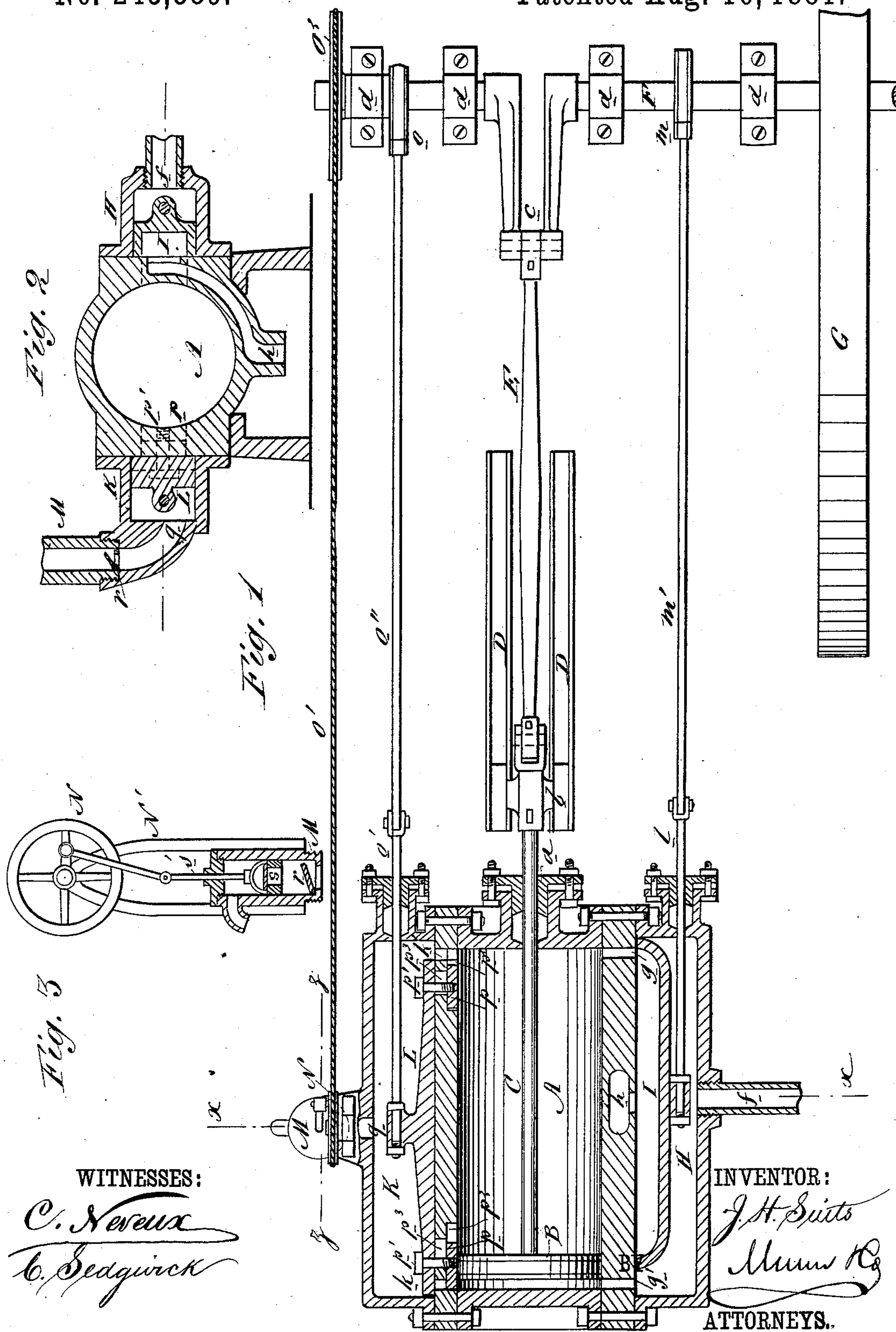


J. H. SUITS.
STEAM ENGINE.

Patented Aug. 16, 1881.



UNITED STATES PATENT OFFICE.

JAMES H. SUITS, OF BUTLER, ILLINOIS.

STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 245,889, dated August 16, 1881.

Application filed April 23, 1881. (No model.)

To all whom it may concern:

Be it known that I, JAMES H. SUITS, of Butler, in the county of Montgomery and State of Illinois, have invented a new and Improved Steam-Engine, of which the following is a full, clear, and exact description.

This invention relates especially to high-pressure engines, and its object is to increase the effective power of the steam by creating a vacuum behind the piston.

The invention consists in the addition of a vacuum-chamber to the steam-cylinder, with which chamber the cylinder communicates by means of ports corresponding with the cylinder steam-ports, said vacuum-chamber being supplied with a suitable valve, and being exhausted of residual air and steam by an air-pump, so that the steam and air behind the piston at the end of each stroke shall escape into the vacuum-chamber, and be thence removed by the air-pump.

Figure 1 is a longitudinal, partly sectional, plan of a horizontal steam-engine with my improved device applied. Fig. 2 is a cross-sectional elevation on line $x x$, Fig. 1. Fig. 3 is a vertical sectional elevation on line $z z$, Fig. 1.

Similar letters of reference indicate corresponding parts.

In the drawings, A represents the steam-cylinder; B, the piston; C, the piston-rod, passing through the cylinder stuffing-box a , and having on its end a cross-head, b , sliding in guide-bars D. E is the connecting-rod, connecting the piston-rod C with the crank c of the driving-shaft F, that is journaled in bearings d ; and G is the fly-wheel.

On one side of the cylinder A is a steam-chest, H, into which steam enters through the supplying-port f , said steam-chest H communicating with the cylinder A through steam-ports $g g'$. I represents the sliding valve of the steam-chest H, connected to the shaft F by valve-stem l , connecting-rod m' , and eccentric m ; and h , the exhaust-port. On the opposite side of the cylinder A is the vacuum-chamber K, communicating with the cylinder A through exhaust-ports $k k'$ at either end thereof.

L represents the vacuum-chamber sliding valve, connected with the driving-shaft F by valve-rod o' , connecting-rod o'' , and eccentric o . This vacuum-chamber valve L has connected to its face at each end thereof, and held at a short distance therefrom by bolts p' , a block, p , which slides in a recess or groove, p^2 , formed in the inner face of the steam-cylinder A, the bolts p' passing through slots p^3 in the valve-seat. These blocks p form an essential part of the valve L, as they prevent the lifting of said valve L by the combined effect of the steam beneath it and the vacuum above it, while the action of the steam and vacuum tends, by lifting the valve L, to press the blocks p more closely over the ports $k k'$, thus making the valve air-tight.

Connected with the exhaust q of the vacuum-chamber K is an air-pump, M, provided with an ordinary valve, r , and a piston and rod, $s s'$, the latter of which is connected with the eccentric N, that is mounted on a suitable standard, N' , and is operated by a cord or belt, O' , that runs from a pulley, O^2 , on the main driving-shaft F.

It is designed that the air-pump M shall make about four strokes for every revolution of the fly-wheel G, so that there shall be a partial vacuum in the chamber K all the time. The two valves I L move in contrary directions from each other—as, for instance, when the valve I closes the steam-port g and opens the steam-port g' the valve L closes the port k and opens the port k' immediately after steam has exhausted beneath the valve I, and, there being a partial vacuum all the time in the chamber K, it necessarily follows that the heated air, vapor, or steam which may remain behind the piston at each stroke will rush through the alternately-opened ports $k k'$ into the vacuum-chamber K, and thence be exhausted by the air-pump M.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination, with the steam-cylinder A, having exhaust-ports $k k'$, and recesses or grooves p^2 , of the vacuum-chamber valve L,

constructed with end blocks, *p*, secured by bolts *p'*, substantially as herein shown and described, whereby the said ports are closed by the vacuum in the vacuum-chamber, as set forth.

- 5 2. In a steam-engine, the combination, with the steam-cylinder *A*, provided with exhaust-ports *k k'*, of the vacuum-chamber *K*, provided with reciprocating valve *L* and air-pump *M*,

substantially as herein shown and described, whereby the residuum of steam behind the piston is exhausted, as set forth. 10

JAMES H. SUITS.

Witnesses:

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WM. ABBOT.