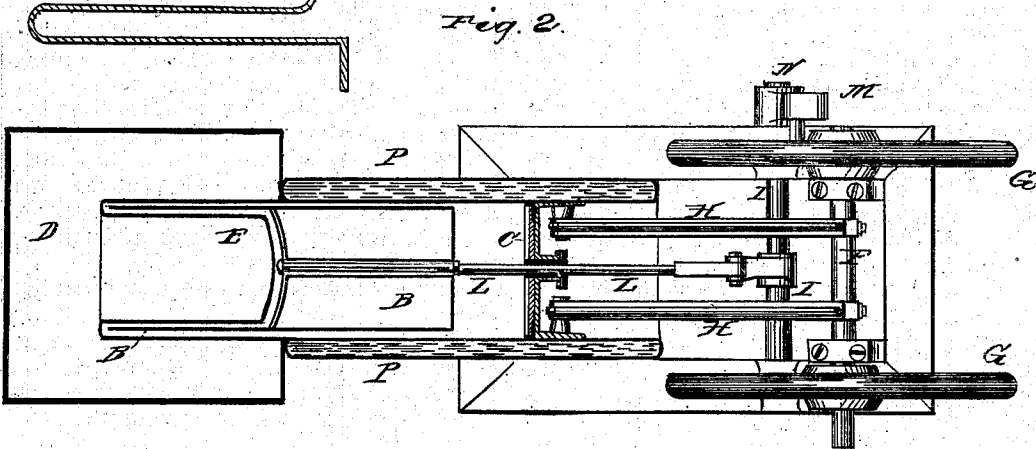
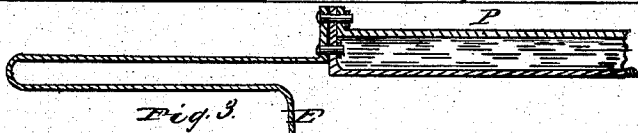
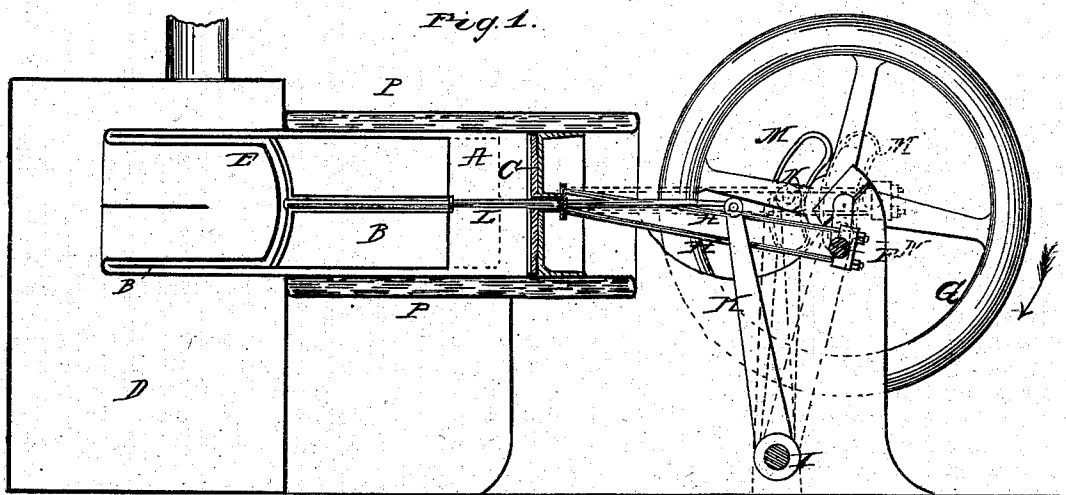


O. STENBERG.

HIGH-PRESSURE HOT-AIR ENGINES.

No. 186,377.

Patented Jan. 16, 1877.



Witnesses.  
*And G. Dietrich*  
*John Deering.*

Inventor  
*Oscar Stenberg*

By *Daniel Bredt*  
7784

# UNITED STATES PATENT OFFICE.

OSCAR STENBERG, OF ZERBST, ASSIGNOR OF ONE-HALF HIS RIGHT TO GOTTFRIED SACHSENBERG AND FRIEDRICH SACHSENBERG, OF ROSS-LAU, GERMANY.

## IMPROVEMENT IN HIGH-PRESSURE HOT-AIR ENGINES.

Specification forming part of Letters Patent No. 186,377, dated January 16, 1877; application filed August 16, 1876.

*To all whom it may concern:*

Be it known that I, OSCAR STENBERG, a citizen of Russia and resident of Zerbst, Germany, have invented certain Improvements in Hot-Air Engines, of which the following is a specification:

In the accompanying drawings, Figure 1 is a longitudinal section. Fig. 2 is a top view, partly in section. Fig. 3 is a detached view of the fire-pot in section, and a portion of the main cylinder and the water cylinder or cooler.

The object of my invention is to simplify the construction of a hot-air engine, and to secure the direct action of the air upon piston and crank-shaft, and also to retain the air for considerable time in the cooler.

My invention consists of an isolator vibrating in the main cylinder, between the fire-pot or heater and the water cylinder or cooler, in combination with a rock-shaft having a radial arm, provided with a curved or arc-shaped slot, both arranged to operate in connection with other devices, all of which will be understood by the following description.

In the drawings, the main cylinder is seen at A, with the vibrating isolator B and the piston C working therein. On the left is the furnace or fire-chamber D, with the fire-pot or heater E in the upper part thereof; and on the right hand is the crank-shaft F, Fig. 2, supported in the usual bearings and carrying two balance-wheels, G. Two connecting-rods, H, extend from the crank-shaft F to the piston C, Fig. 2, the action of which will be hereafter described.

The rock-shaft I has a radial lever, K, the upper end of which is pivoted to the isolator-rod L, which has some elasticity or spring action, so as to bend, and thus accommodate itself to the motion of the lever when moved by the rock-shaft. One end of the rock-shaft carries a radial arm, M, the upper end of which has a curved or arc-shaped slot, which

connects with and works on a crank-pin, N, provided with an anti-friction roller. (Shown in dotted lines, Fig. 1.)

The main cylinder A, the water-cylinder P, and the fire-pot or heater E are made of cast-iron, and connected, as shown in Fig. 3. The fire-pot is doubled back upon itself, or folded so as to give the greatest amount of heating-surface.

The isolator B is made of wrought-iron, and arranged to vibrate to and fro between the fire and the cooler. On the left the open end of the hollow cylinder of the isolator extends into the fire-pot, nearly to the fold thereof.

The fire-pot being heated, and the crank-shaft F being placed on the dead-point, to the right, so that the air remains in the cool room, the engineer puts his hand upon one of the balance-wheels, and turns the same in the direction of the arrow in Fig. 1, and thus starts the engine. By the motion of the piston C the air is compressed in the cool room, and when the compression is complete the isolator moves suddenly to the right, and drives the cooled and compressed air into the fire-pot or heater E. Then, as the air becomes heated, it expands with a double force and reacts upon the piston C, which thus gives power to move the crank-shaft F.

Having thus described my invention, I claim—

The curved slot M' in the arm M, in combination with the rock-shaft I, lever K, isolator B, piston C, crank-shaft F, and crank-pin N, all arranged to operate substantially as set forth.

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

OSCAR STENBERG.

Witnesses:

BERTHOLD ROI,  
EDWARD P. MACLEAN.