

(No Model.)

D. D. HARDY.
VIBRATING ENGINE.

No. 373,287.

Patented Nov. 15, 1887.

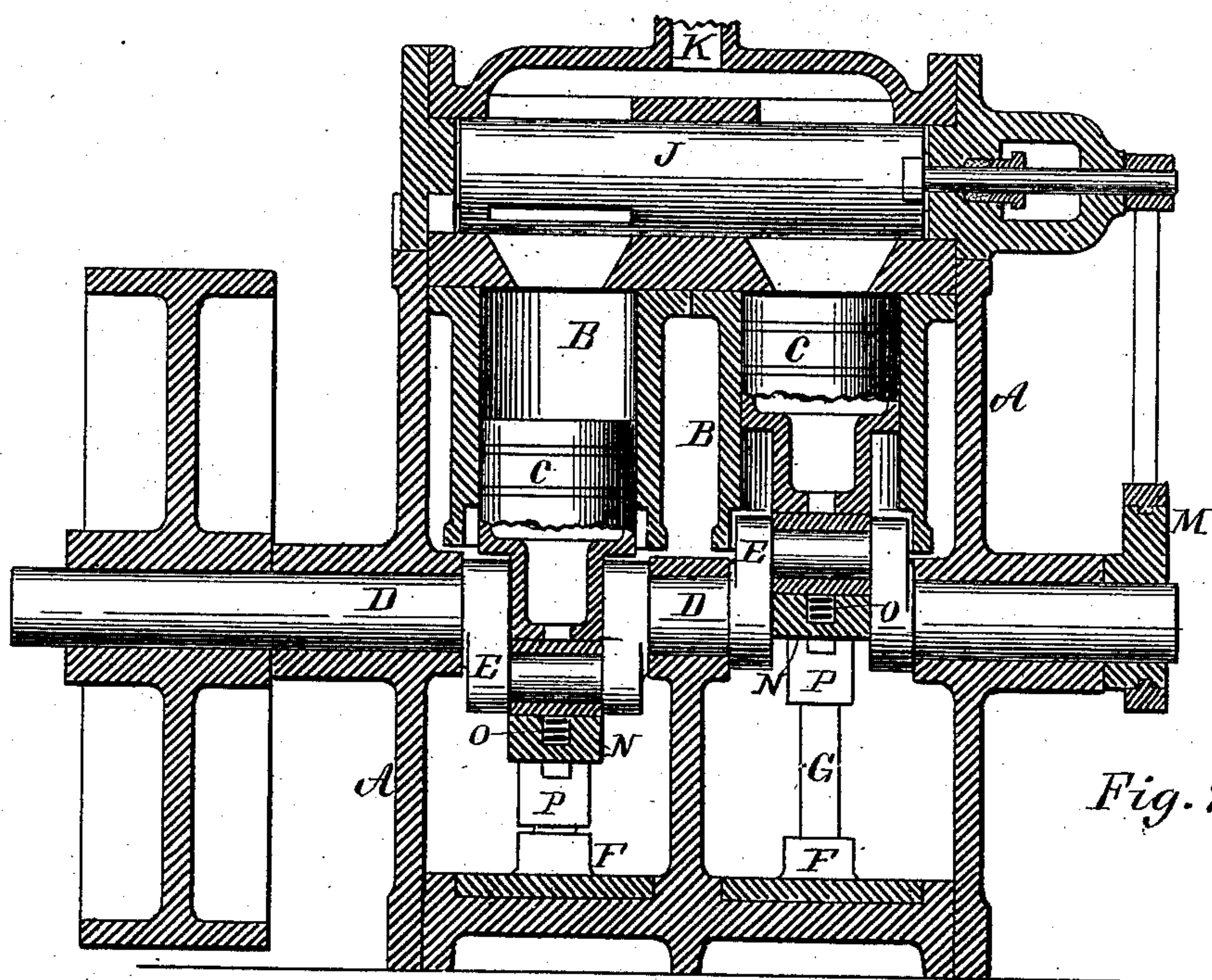
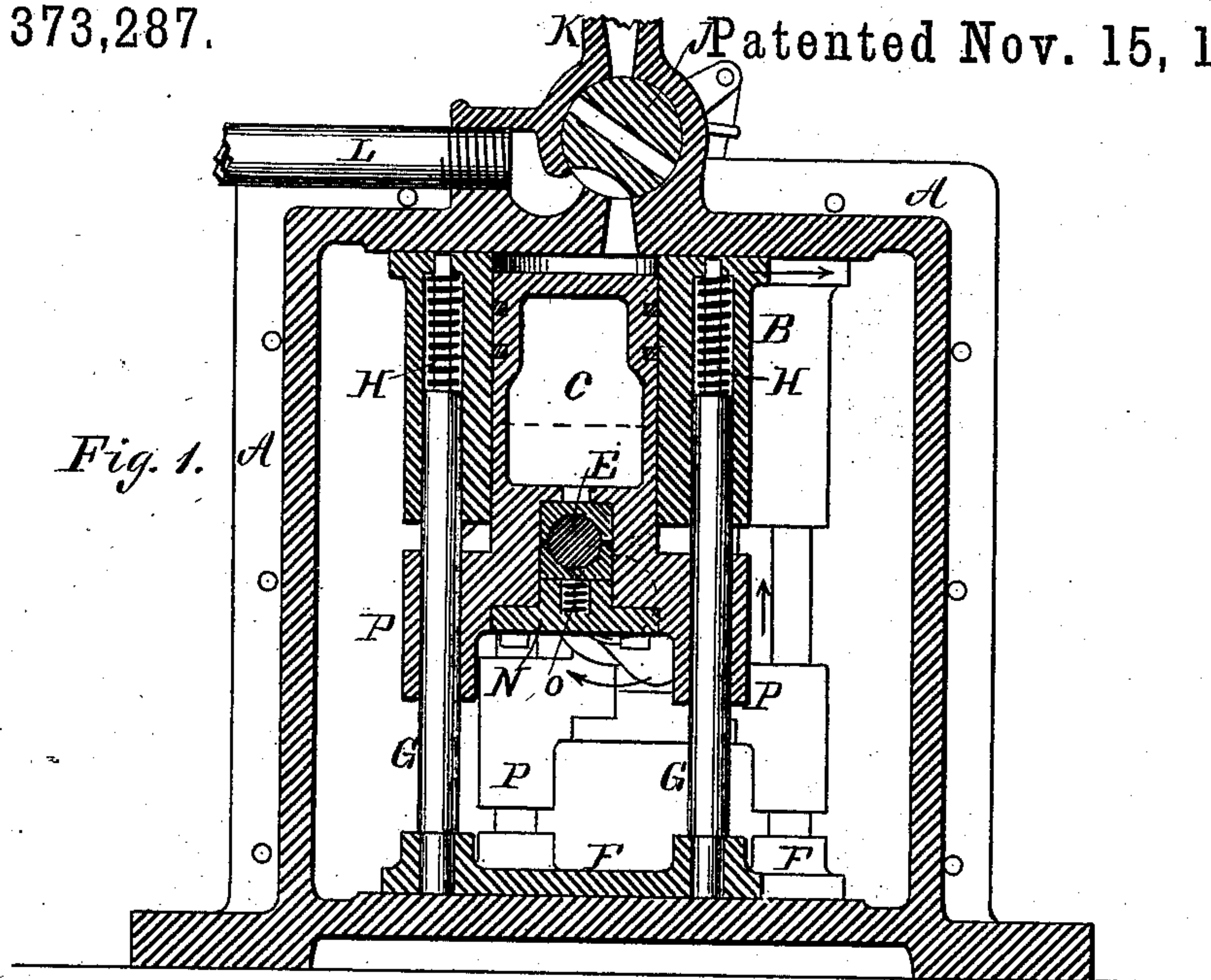


Fig. 2.

Witnesses:

Allen J. Bennett
William F. Fawcett.

Inventor:

Dexter D. Hardy,
per A. H. Mansfield, Atty.

UNITED STATES PATENT OFFICE.

DEXTER D. HARDY, OF CHICAGO, ILLINOIS.

VIBRATING ENGINE.

SPECIFICATION forming part of Letters Patent No. 373,287, dated November 15, 1887.

Application filed March 17, 1887. Serial No. 231,257. (No model.)

To all whom it may concern:

Be it known that I, DEXTER D. HARDY, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented new and useful Improvements in Vibrating Engines, of which the following is a specification.

My invention relates to improvements in small direct acting or vibrating engines; and the objects of my improvements are to simplify the construction of such engines and to balance them so as to render them capable of high speed.

Referring to the drawings, which form part of this specification, Figure 1 is a vertical cross-section on a plane passing through the axis of one of the cylinders, and Fig. 2 is a vertical longitudinal section through the axes of both cylinders.

A is the casing of the engine.

B B are the steam-cylinders; C C, the pistons; D, the main shaft; E E, the main-shaft cranks; F F, sliding plates carrying the standards G G, which enter at their top ends sockets in the cylinders B B and act against springs H H in said sockets.

J is the steam-valve which governs the admission and discharge of steam to and from the cylinders. Steam is admitted to the valve-chamber at K and exhausted at L.

M is the eccentric, operating the valve in a usual way.

The pistons C C take hold of the crank-pins directly without the use of any connecting-rod. They are journaled to the crank-pins in a usual manner, except that the caps N N contain springs O O, to force the lower half of the journal-box up against its journal to take up lost motion. Each piston carries two lugs or bosses, P P, at its lower end, which are fitted to slide on the standards G G. While the pistons reciprocate vertically the steam-cylinders reciprocate in a horizontal direction. This admits of, and, through the action of steam on the pistons, produces, a circular movement of the cranks. The springs H H, acting on the cylinders on one side and on the standards G G on the other side and through them on the sliding plates F F, tend to force said plates and cylinders away from each other.

This causes the cylinders, which are open at their tops, to bear firmly against the inside surface of the casing, which is prepared for them, maintaining a steam-tight joint between cylinders and casing.

The springs O in the caps N cause the boxes to hug the crank-pins constantly to prevent "pounding" of the pistons on said crank-pins. The cranks E E are placed one hundred and eighty degrees apart, which causes the weights of the reciprocating pistons to balance each other in all positions.

The lugs P P of the pistons are fitted to slide on the rods G G in order to relieve the pistons themselves of side strain and wear in the cylinders.

I do not confine myself to two cylinders and pistons, for any number above two may be used, and a similar balance of parts produced by placing the cranks at equal angular distances apart. The cylinders may be placed below or beside the shaft, or in any angular position beside each other in their plane of vibration, the plates F being arranged in any case opposite or on the other side of the shaft from the cylinders, yet I prefer the arrangement shown.

What I claim as my invention is—

1. A vibrating engine consisting of two or more single-acting rectilinear vibrating cylinders, in combination with pistons journaled directly to separate cranks at equal angular distances apart on the same shaft and their connecting parts, substantially as set forth.

2. In a vibrating engine, the combination of the vibrating cylinder B with the rods G G, springs H H, and plate F, to support said cylinder, substantially in the manner and for the purpose set forth.

3. In a single-acting vibrating engine, the piston C, carrying the lugs P P, sliding on the rods G G, as described.

4. In a single-acting vibrating engine, the piston C, journaled directly to the crank E and carrying the cap N, with the spring O, to take up lost motion, as set forth.

DEXTER D. HARDY.

Witnesses:

WILLIAM J. FAULKNER,
ALBERT K. MANSFIELD.