2 Sheets. Sheet 1.

# Nation & Hall,

## Oscillating Steam Engine.

No. 49,293. Patented Aug. 8, 1865.

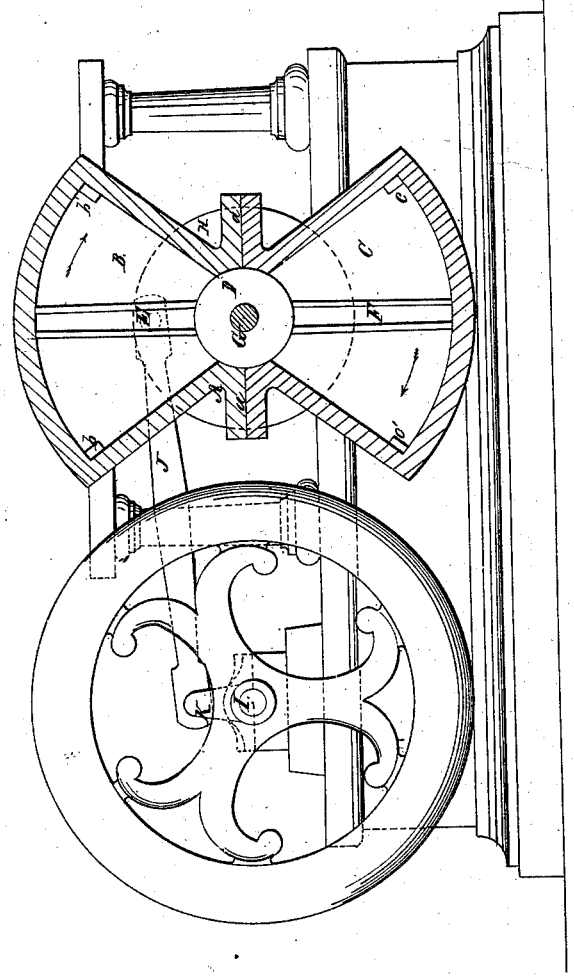


Fig. 1.

Fig. 4.

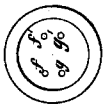

Fig. 5.

Witnesses.

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2 Sheets-Sheet 2.

# Nation & Hall,

## Oscillating Steam Engine.

No. 49,293. Patented Aug. 8, 1865.

Fig. 2.

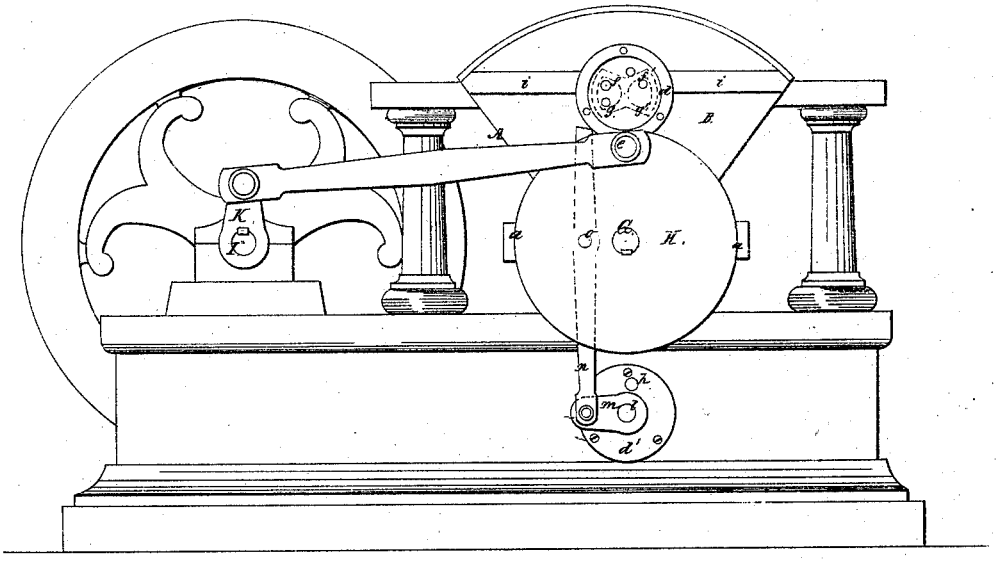
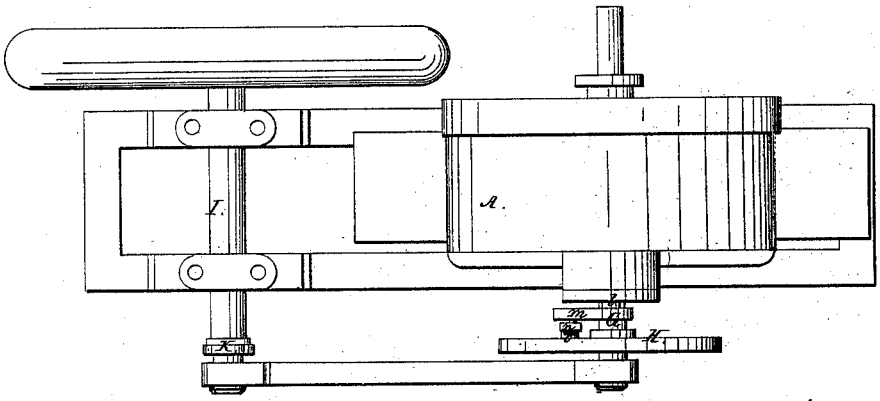



Fig. 3.

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# UNITED STATES PATENT OFFICE.

DAVID H. NATION AND THOS. B. HALL, OF ST. LOUIS, MISSOURI.

## IMPROVEMENT IN OSCILLATING STEAM-ENGINES.

Specification forming part of Letters Patent No. **49,293**, dated August 8, 1865.

*To all whom it may concern:*

Be it known that we, DAVID H. NATION and THOMAS B. HALL, of the city and county of St. Louis, and State of Missouri, have inventd a new and Improved Oscillating-Piston Engine; and we do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 represents a sectional side elevation of this invention, one of the cylinder-heads being removed to expose the piston. Fig. 2 is an elevation of the same, showing the opposite side from Fig. 1. Fig. 3 is a plan or top view of the same. Figs. 4 and 5 are detached sectional views of the valve-seat, with its ports, and of the valve.

Similar letters of reference indicate like parts.

This invention relates to certain improvements in that class of engines known as "oscillating-piston engines." The cylinder is composed of two segmental boxes, which are bolted together by means of flanges, and the inner spaces of which are separated one from the other by a central boss, which is firmly keyed to the oscillating piston-rod, and from which extend the pistons in combination with suitable steam-supply and exhaust ports in such a manner that by the action of the steam on said pistons an oscillating motion is imparted to the shaft, which, by suitable connections, is converted into a continuous rotary motion of the fly-wheel shaft. Each section of the cylinder is provided with a separate valve, and both valves are operated by a common pitman connected to an eccentric wrist-pin, which is inserted in the inner surface of a disk or arm mounted on the oscillating piston-rod, and they are so adjusted that steam is admitted to each cylinder and exhausted therefrom at the proper intervals.

A represents the cylinder of our engine, which consists of two segments, B C, connected to each other by flanges *a*, as clearly shown in Fig. 1. The inner spaces of the two segments are separated one from the other by a boss, D, which is fitted steam-tight in its seat, and from which radiate the two pistons E F. The boss D is firmly keyed to the piston-rod G, which extends through suitable stuffing-boxes in the sides of the cylinder, and the pistons fit steam-tight in the interior of the segments B C.

Each segment is provided with two ports, *b b′ c c′*, which alternately form the steam and exhaust ports, and these ports communicate with steam-chests *d d′* in such a manner that if the segment B takes steam through the port *b* and exhausts through the port *b′*, the segment C takes steam through the port *c* and exhausts through the port *c′*, and vice versa; and if steam is admitted through the ports *b c*, the pistons turn in the direction of the arrow marked thereon in Fig. 1, and vice versa. By these means an oscillating motion is imparted to the piston-rod G, and an eccentric wrist-pin, *e*, secured in the face of a disk, H, which is keyed to the end of the piston-rod, serves to transmit the oscillating motion of the same to the fly-wheel shaft I. Said wrist-pin connects by a pitman, J, with the crank K, which is mounted on the end of the fly-wheel shaft, and the length of the crank K is so proportioned in relation to the distance of the wrist-pin *e* from the center of its rotation and to the length of the oscillations of the piston-rod that the fly-wheel shaft is compelled to rotate continually by the oscillations of the piston-rod.

The steam-chests *d d′* are connected or cast solid with one of the cylinder-heads, and their bottoms form the seats for the valves *e′*, a detached face view of one of which is shown in Fig. 5. Each of the steam-chests is provided with four ports, *f f′ g g′*, two of which form the steam and two the exhaust ports, and steam is admitted to the chests through holes *h* in their covers. The ports *f f′* communicate by means of channels *i* with the ports *b b′ c c′* in the cylinder, and the exhaust-ports *g g′* communicate by suitable channels with holes in the sides of the steam-chests which lead to the open atmosphere. The ports *f g* and *f′ g′* are close together, as shown in Fig. 4, and the valves are fitted with cavities in their faces, and they are so shaped that either pair of ports *f g* or *f′ g′* can be covered by one of the wings of the valves; but if the ports *f g* are so covered, the port *f′* is open to take steam, and if the ports *f′ g′* are

covered by the valve, the port *f* is open to take steam. Those ports which are covered by one of the wings of the valve communicate with each other through the cavity in the face of said wing, and the steam from that side of the cylinder is free to exhaust, while at the same time the other side takes steam.

The stems *l* of the valves extend through stuffing-boxes in the covers of the steam-chests, and cranks *m*, mounted on their outer ends and pointing in opposite directions, are connected to each other by a pitman, *n*. This pitman is attached to an eccentric wrist-pin, *o*, projecting from the inner or rear surface of the disk H, which is mounted on the piston-rod. By these means both the valves are moved simultaneously in opposite directions, and steam is admitted to and exhausted from both sections of the cylinder at the proper intervals.

An engine of this description can be run with great velocity, and the piston-surface is considerable, so that a comparatively large effective power is obtained.

It is obvious that one of the segments, B or C, could be left off and the engine constructed with a single box and piston.

We claim as new and desire to secure by Letters Patent—

The combination and arrangement of the segmental boxes B C, oscillating pistons E F D, piston-rod G, steam-chests *d d'*, valves *e'*, pitman *n*, and eccentric wrist-pins *e o*, as and for the purposes herein specified.

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Witnesses:
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