

N. E. NASH.
Steam-Engine.

No. 218,051.

Patented July 29, 1879.

FIG. I.

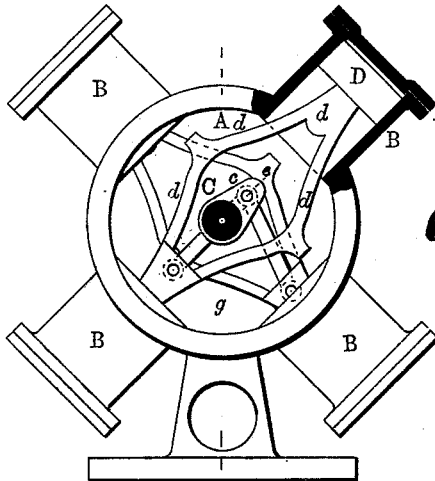


FIG. II.

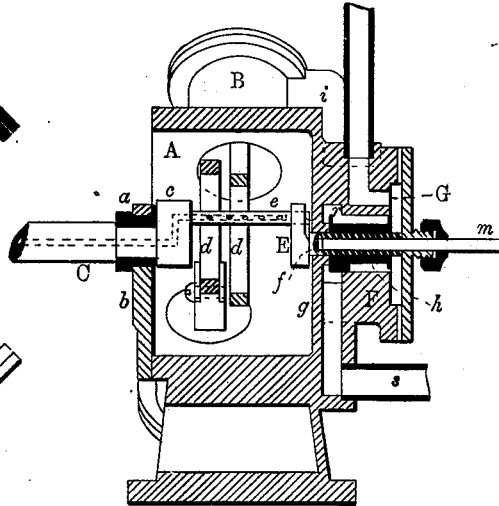


FIG. III.

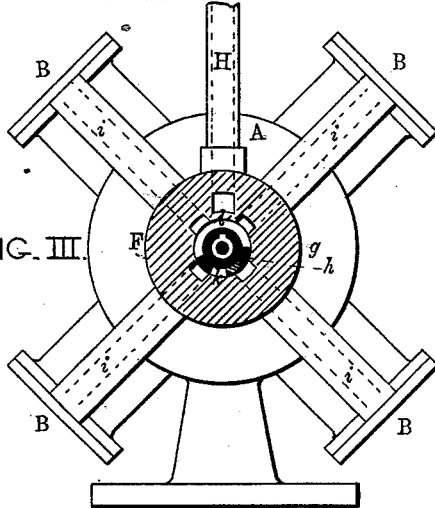


FIG. IV.

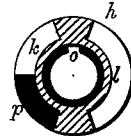


FIG. V.

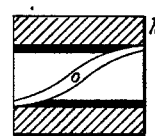


FIG. VI.

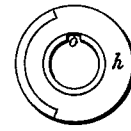


FIG. VII.

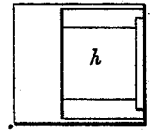


FIG. VIII.

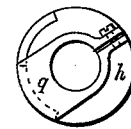


FIG. IX.

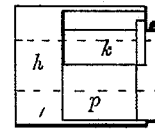


FIG. X.



FIG. XI.



FIG. XII.



WITNESSES.

INVENTOR.

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UNITED STATES PATENT OFFICE.

NATHAN E. NASH, OF WESTERLY, RHODE ISLAND.

IMPROVEMENT IN STEAM-ENGINES.

Specification forming part of Letters Patent No. **218,051**, dated July 29, 1879; application filed December 24, 1878.

To all whom it may concern:

Be it known that I, NATHAN E. NASH, of Westerly, in the State of Rhode Island, have invented certain Improvements in Steam-Engines, of which the following is a specification; and I do hereby declare that in the same is contained a full, clear, and exact description of my said invention, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

This invention relates to certain improvements in that class of steam-engines wherein a series of steam-cylinders are placed at equal distances apart and radially around the driving-shaft to which the pistons of the said cylinders are connected; and it consists, first, in a novel manner of connecting the said pistons in pairs and attaching the paired pistons to the crank-pin of the driving-shaft.

The said invention consists, secondly, in constructing the valve which controls the movement of the steam to and from the steam-cylinders in such manner as to admit of the driving-shaft being revolved in either direction; and, thirdly, in an improved construction of various other parts of the engine, whereby its efficiency as a motor is increased, as will hereinafter appear.

In the accompanying drawings, forming a part hereof, Figure 1 is a partially-sectional side view of the improved engine. Fig. 2 is a partly-sectional end view of the engine. Fig. 3 is a reverse view of Fig. 1, also partly in section. Figs. 4, 5, 6, 7, 8, 9, 10, 11, and 12 are enlarged views of parts of the engine.

Similar letters of reference indicate similar parts in all the views.

A is a circular hollow casting, from which project in radial lines the steam-cylinders B. C is the driving-shaft, supported at its inner end by means of a suitable bearing, *a*, formed in a plate, *b*, secured to the open end of the casting A. The said driving-shaft is provided with a crank, *c*, situated within the casting A, to which the pistons D are indirectly attached, as hereinafter described. The pistons opposite to each other are united by means of open rods *d*, which are fastened rigidly to their inner faces. These open rods admit of the rotation of the shaft and crank centrally of the casting A, and each rod is furnished with a

pivoted link connecting the same to the crank-pin *e*. A secondary crank, E, also located in the casting A, is rotated through the medium of the crank-pin *e*, and its shaft *f* projects through the head *g* of the casting, to operate a valve, *h*, adapted to govern the movement of steam to and from the cylinders.

The steam-ports *i* extend from near the outer end of the cylinder to a central circular opening in a projection, F, on the outer surface of the head *g*, in which circular opening the valve *h* is revolved by means of the secondary shaft *f*, as before described. The said valve consists of a cylindrical block, having portions of its periphery removed to form the steam and exhaust passages, respectively represented by *k* and *l*.

To effect the attachment of the secondary shaft *f* to the valve *h*, the said shaft is hollow and slotted longitudinally, and a rod, *m*, having a projection, *n*, inserted in the hollow shaft, with the said projection extending through the said slot into a spiral slot, *o*, in the valve. The object of the spiral groove or slot *o* is to allow of a partial rotary movement of the valve *h* independently of the hollow shaft, to effect the forward and backward movement of the engine by the longitudinal motion of the rod *m*.

As it is necessary in effecting the reversal of movement of the engine that the relative positions of the steam and exhaust passages in the valve *h* should be changed, as well as the position of the valve with reference to the ports *i* altered, I construct the steam-passage *k* double the required length and insert therein a curved block, *p*, which may be moved to either end thereof. Theoretically the position of the block *p* would be changed in moving the valve independently of the secondary shaft, upon which it is placed; but in practice it is found that it has a tendency to follow the valve. To avoid this combined motion of the valve and curved block I attach the said curved block to a collar, *q*, which is tightened upon the said shaft by means of a screw, so as to produce sufficient friction to cause the stoppage of rotation of the collar and curved block until the said block comes into contact with the solid metal at the end of the passage in the valve.

Steam from the boiler is introduced to a

space between the head F and the face G through a pipe, H, and the exhaust-steam passes from the exhaust-passage I to an annular space, r, and thence to the pipe s, leading to the open air.

In order to lubricate the crank-pin c, I make the shaft, crank c, and the said crank-pin hollow, and provide the said crank-pin with lateral openings leading from the central one, as shown in the drawings.

Oil is introduced into the outer end of the shaft by any suitable means, and finally reaches the exterior of the crank-pin, thereby effecting the desired result.

Having thus described my invention, what I claim as new, and wish to secure by Letters Patent of the United States, is—

1. A circular hollow frame having cylinders placed radially thereon, combined with open rods connecting the pistons in pairs, a central shaft, a driving-crank, and connecting-rods uniting said open rods and the crank-pin, all arranged substantially as specified.

2. A circular hollow frame having cylinders placed radially thereon and pistons united in

pairs by open rods, as described, combined with a central shaft, a driving-crank, a crank-pin, connecting-rods, and a secondary crank operating the valve mechanism, all arranged substantially as set forth.

3. The valve h, consisting of a cylindrical block provided with peripheral steam and exhaust passages, the said steam-passage being of a greater circumferential length than is utilized in introducing steam to the cylinders, and fitted with a curved block, p, adapted to be moved to either end of the said steam-passage, for the purpose of practically changing the relative positions of the said steam and exhaust passages in the said valve, and thereby altering the direction of rotation of the engine, substantially as herein set forth.

In testimony whereof I have hereunto subscribed my name this 14th day of December, A. D. 1878.

NATHAN E. NASH.

Witnesses:

WM. T. HOWARD,
THOS. MURDOCH.