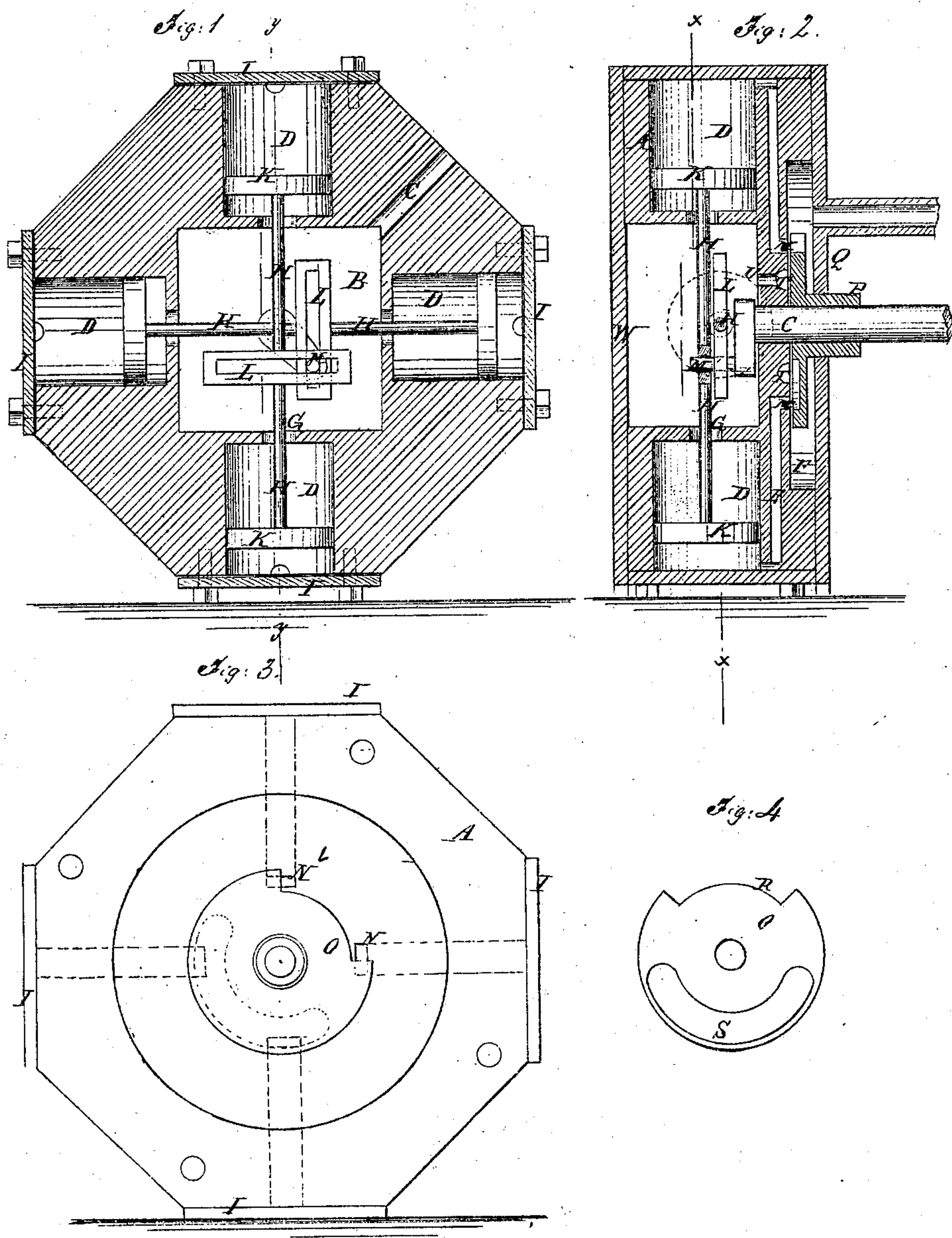


N. E. Nash.

Steam Engine.

No. 113,553.

Patented April 11, 1871.



Witnesses:

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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. 113,553, dated April 11, 1871.

*To all whom it may concern:*

Be it known that I, NATHAN E. NASH, of Westerly, in the county of Washington and State of Rhode Island, have invented a new and useful Improvement in Steam-Engines; and I 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 drawing forming part of this specification.

This invention relates to improvements in steam-engines; and it consists in an arrangement of four cylinders radially in a four or eight sided or circular piece of metal, and a connection of the pistons, in pairs, with the wrist-pin of the crank by one yoke or slotted bar, to which the two coincident piston-rods are connected; and it also consists in a novel arrangement on the crank-shaft, and with the ports of a notched rotary disk for opening and closing the ports, all as hereinafter described.

Figure 1 is a sectional elevation of my improved engine taken on the line *x x* of Fig. 2; Fig. 2 is a sectional elevation taken on the line *y y* of Fig. 1; Fig. 3 is a side elevation with the plate inclosing the steam-chest removed; and Fig. 4 is a face view of the valve-disk.

Similar letters of reference indicate corresponding parts.

A is a four or eight sided or rounded block with a large opening, B, in its longitudinal axis. This block, which is preferably cast in one piece, is as wide in its radial or transverse axis as is required for two cylinders of the length of the stroke of the engine, to be arranged with their axes coincident with each other, with sufficient space between for gearing with the crank-shaft C, which is to be arranged in the axis of the converging point of four cylinders, D, arranged radially in the block and equidistant from each other; and in the longitudinal axis of the block it is to have sufficient breadth for containing the cylinders D, ports or passages E, and the steam-chest F. The cylinders are to be bored completely through the block from the outer face to the opening B, or they may stop a little short and have small holes, G, for the piston-rods H, which holes are not fitted with stuff-

ing-boxes, which it is one of the objects of the invention to avoid, for reducing the friction. Four cylinders are used, so that the steam may be applied to the piston only on the side opposite the one from which the rod extends, which side is closed in by a head, I, and the other end left open. The pistons K of the two coincident cylinders are connected by their rods H with a yoke or slotted bar, L, arranged perpendicular to the pistons, and taking the wrist-pin M of the crank in the slot. The yoke of each pair is connected to the one wrist-pin. The two pairs are arranged in different parallel planes for allowing the yokes to work side by side to make this connection. N represents the steam-ports, which are arranged in one side of the block A, in a circle around the center, which may be of greater or lesser radius according to the nature of the case. Said ports open into the passages E leading therefrom to the outer ends of the cylinder. They are covered by the disk O, which is attached to the crank-shaft, so as to rotate with it and be adjusted against the side of block A with sufficient pressure to cover the ports steam-tight. This disk has a sleeve, P, which projects out of the steam-chest through the cover Q, which is to be provided with a stuffing-box for packing steam-tight. This plate O has a long notch, R, in its edge, extending nearly one-quarter of its circumference, which notch passes over the ports and uncovers them to the live steam. It is of sufficient length to partly uncover one port before wholly covering the one behind it. S is a circular groove in the face of the disk which fits against the valve-seat or the side of block A, for forming a passage from the steam-ports to the annular groove T, from which the exhaust-passage V conducts it into the space B, inclosed at the end by plate W, where it may impart its lubricating qualities to the working parts previous to escaping through the passage V, or it may be any other suitable escape passage or pipe. The slotted bars or yokes L are intended to be fitted in or on guides at the ends, to serve as cross-heads for piston-rods. The disk O is so adjusted on the shaft that the end of the notch R, which is in advance, will uncover each port just at the moment the piston of the cylinder into which the port uncovered leads is at the outer-



most position and begins to move inward; and it is intended to be arranged so that it may be adjusted either way around the shaft for varying the lead.

I propose to introduce an adjustable ring in a groove in the block A, and arrange the ports through it so that, by shifting the ring back and forth, the point of cutting off may be varied.

Said ring may be turned by any suitable arrangement of apparatus capable of being actuated at the exterior—for instance, a pinion and shaft, the former gearing with the ring and the latter projecting through the case; or the said ring may be actuated automatically by a governor attached to the shaft inside the stuffing-box and working by centrifugal force. The block A will be, especially in large engines, so shaped as to dispense with considerable amount of the surplus metal in the angles between the cylinders and other parts.

This improved engine being so much simpler in construction than the common reciprocating or oscillating engines, the first cost will be greatly reduced, and it affords a very great economy in space over the ordinary reciprocating engines. It is also entirely self-contained, and, being set either on one of the sides to arrange the shaft horizontally, or on

the end for placing the shaft vertically, has a permanent base to rest on.

It will be seen that only one stuffing-box is employed throughout the engine, thereby economizing in the power required to overcome friction in other engines.

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

1. The improved engine having four cylinders radiating at equidistant points around the axis of the crank-shaft, the pistons of each coincident pair connected to a slotted yoke or bar, and said yokes or bars of both pairs connected to the one crank-pin, all substantially as specified.

2. The ports N and the annular exhaust-passage T arranged in circles around the crank-shaft in the side of the block A, in which the cylinders are formed, and the combination therewith of the adjustable disk O, having the notch R and groove S', all substantially as specified.

The above specification of my invention signed by me this 31st day of December, 1870.

NATHAN E. NASH.

GEO. W. MABEE,  
T. B. MOSHER.