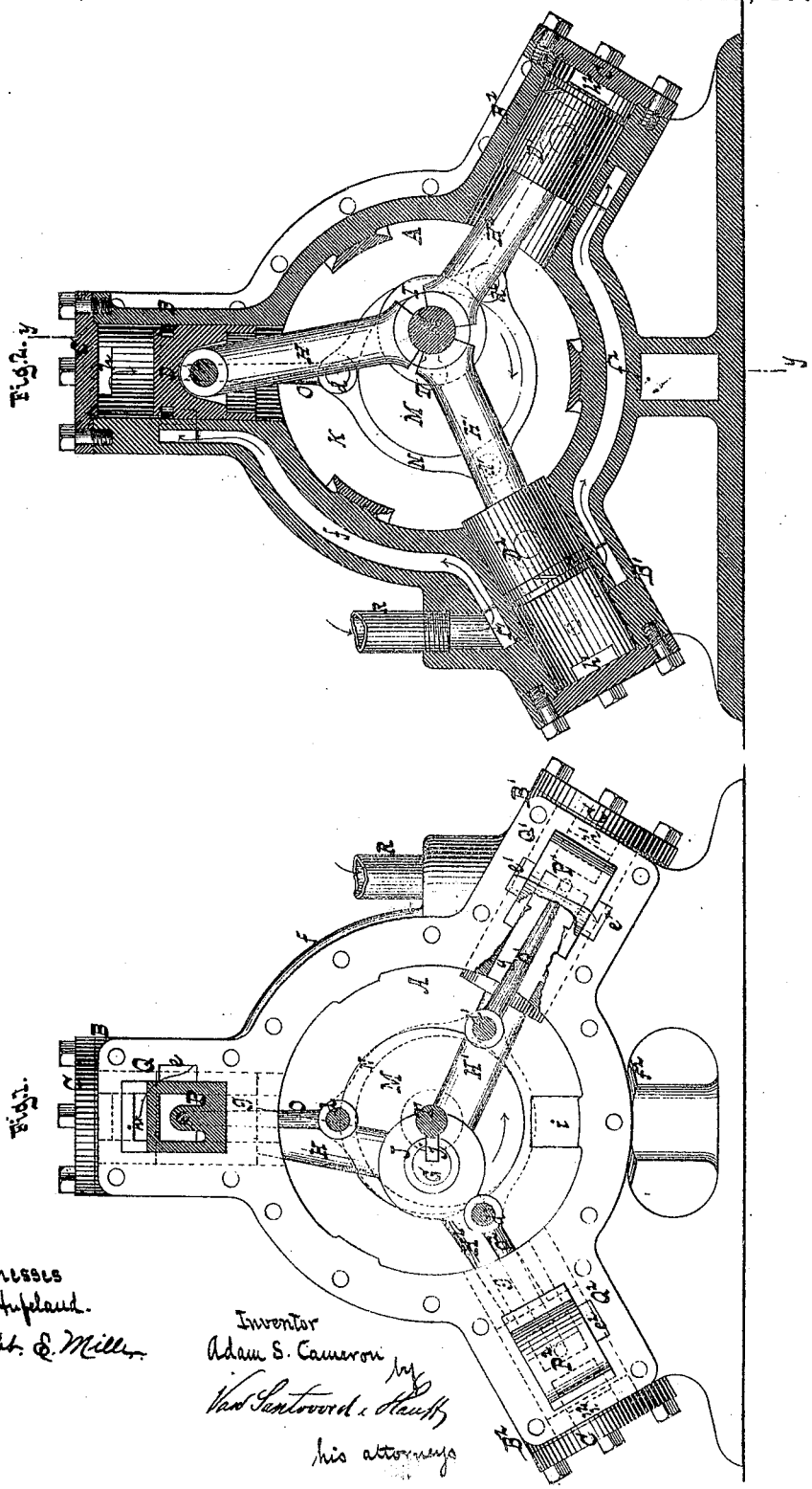
2 Sheets—Sheet 1

A. S. CAMERON.

TRIPLE CYLINDER STEAM ENGINE.

No. 185,293. Patented Dec. 12, 1876.



Witnesses
Otto Hupland.
Robt. S. Miller

Inventor
Adam S. Cameron
by
Van Santvoord & Hauff
his attorneys

2 Sheets—Sheet 2.

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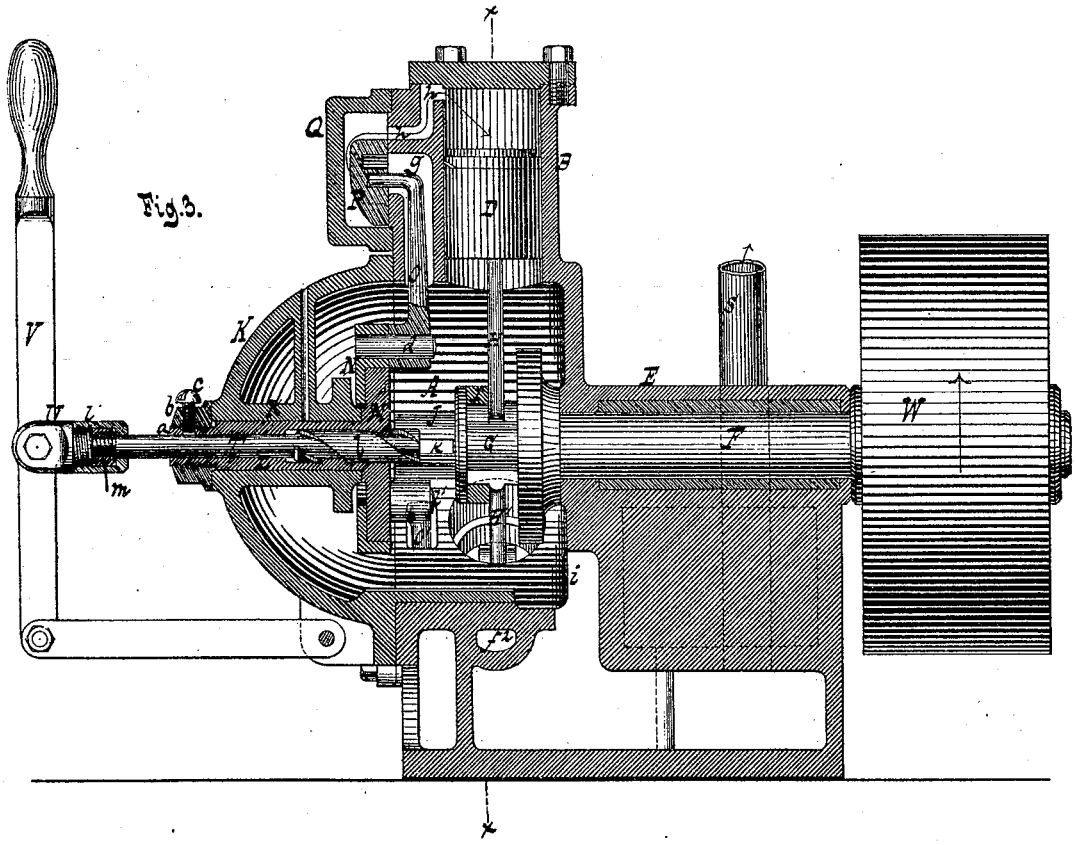
Fig.3.



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UNITED STATES PATENT OFFICE.

ADAM S. CAMERON, OF NEW YORK, N. Y.

IMPROVEMENT IN TRIPLE-CYLINDER STEAM-ENGINES.

Specification forming part of Letters Patent No. **185,293**, dated December 12, 1876; application filed October 11, 1876.

To all whom it may concern:

Be it known that I, ADAM S. CAMERON, of the city, county, and State of New York, have invented a new and useful Improvement in Triple-Cylinder Steam-Engines, which improvement is fully set forth in the following specification, reference being had to the accompanying drawing, in which—

Figure 1 represents a sectional face view, the head of the exhaust-chamber having been removed to expose the working parts. Fig. 2 is a vertical section in the plane *x x*, Fig. 3. Fig. 3 is a vertical section in the plane *y y*, Fig. 2.

Similar letters indicate corresponding parts.

This invention relates to certain improvements in that class of engines which are composed of three or more cylinders, which radiate from a central chamber, and the pistons of which are connected to a common crank-shaft.

In my engine the central chamber forms the common exhaust-chamber for the radiating-cylinders, so that the working parts are lubricated by the exhaust steam. Each cylinder is provided with its own slide-valve to control the supply and the exhaust of the steam. These valves are operated from a common eccentric situated in the common exhaust-chamber, and the rods which form the connection between the eccentric and the valves take hold of said valves under their faces to avoid the necessity of stuffing-boxes. With the eccentric is combined a reversing-gear, which can be operated without stopping the engine.

In the drawing, the letter A designates a circular chamber, from which radiate three (or more) cylinders, B B^1 B^2, which are open at their inner ends and closed at their outer ends by bonnets C. In these cylinders work the plungers D D^1 D^2, which are made in the form of buckets, so that they have sufficient bearing in their cylinders to work up and down without tipping. One side of the chamber A is closed by a solid head, from which extends a projection E, that forms the bearing for the crank-shaft F. The letter G designates the crank-pin, which is situated in the interior of the chamber A, and which connects with the plungers D D^1 D^2 by means of rods H H^1 H^2. (Best seen in Fig. 2 of the drawing.) The inner ends of these connection-rods are T-shaped and concave, and they are held in contact with the crank-pin by a ring, I, which is slipped over the same, (see Fig. 3,) and which is held in position by a sleeve, J, that fits the end of the crank-pin.

The side of the chamber A, which is situated opposite to the end of the crank-pin, is closed by a bonnet, K, from the inner surface of which extends a tubular projection, K′, which forms the bearing for the hub L of an eccentric disk, M, said hub being provided at its outer end with a screw-thread, *a*, to receive a nut, *b*, which prevents the same from moving in the direction of its length, but which allows it to rotate freely in the projection K′, said nut being retained in position by a set-screw, *c*. (See Fig. 3.) On the eccentric disk is placed a ring, N, which turns loosely on the same, and in this ring are secured three studs, *d* d^1 d^2, which catch in eyes formed at the inner ends of the valve-rods O O^1 O^2. These rods extend through cavities *g* formed on the sides of the cylinders B B^1 B^2, and they are provided with hooks which engage with holes in the faces of the steam-valves P P^1 P^2. By this arrangement the connection between the eccentric and the valves is effected without the use of stuffing-boxes, whereby the construction of my engine is materially simplified and the wear of the working parts is reduced.

The valves P P^1 P^2 work in steam-chests Q Q^1 Q^2, which are formed on the sides of the cylinders B B^1 B^2. Steam is supplied through a pipe, R, which communicates with the steam-chest Q through a channel, *f*, and opening *e*, and with the steam-chest Q^1 through a channel, f^1, and opening e^1. In this steam-chest is a second opening, e^*, which admits steam through a channel, f^2, and opening e^2, into the steam-chest Q^2. (See Figs. 1 and 2.) The upper parts of the three cylinders communicate with their respective steam-chests through ports *h* h^1 h^2, and when the steam-valves are moved outward the ports *h* h^1 h^2 are brought in communication through the concave portions of said valves with the cavities *g*, Fig. 3, which lead into the chamber A, so that this chamber receives the exhaust steam from all

the cylinders. In this chamber is a port, *i*, which communicates with the exhaust-pipe S. (See Fig. 3.)

The eccentric disk M is connected with the extension of the crank-pin G by means of an arbor, T, which is provided with a toe, *j*, Fig. 1, that engages with grooves *k* cut through the sleeve J and into the crank-pin G. Said arbor T has its bearing in the hub of the eccentric disk M, and it is in line with the shaft F. On the inner end of this arbor is a steep screw-thread, *l*, which fits a corresponding screw-thread in the hub L and in the eccentric disk M, and the outer end of said arbor is screwed into a nut, *m*, which revolves freely in a socket, *l'*, formed in a link, U, which is pivoted to the reversing-lever V. By means of the screw-thread *l'* the eccentric M is compelled to revolve together, with the arbor T, which receives its motion, through the toe *j*, from the crank-pin G. When the arbor T is drawn out to the position shown in Fig. 3, and the engine is started, the shaft F revolves in the direction of the arrow marked on the pulley W. If the reversing-lever is pushed inward, the toe of the arbor T slides in the groove *k*, and the eccentric disk M is caused to turn one-half of a revolution, and thereby the motion of the engine is reversed. By these means the operation of reversing can be effected without stopping the engine.

If the engine is to run only in one direction, the shaft F is made to extend beyond the crank-pin with the proper throw in relation to said crank-pin to make it answer as an eccentric to drive the valves.

If desired, the shaft F may be made hollow, so as to carry off the exhaust steam from the chamber A. It will also require but little ingenuity to place cut-off valves on the back of the main valves, so as to work the steam expansively.

What I claim as new, and desire to secure by Letters Patent, is—

1. The combination, with the central exhaust-chamber A, the eccentric arranged therein, the series of radiating cylinders B B^1 B^2, and the pistons arranged therein and attached to the eccentric of the valve-rods O O^1 O^2, which are connected with the under side of the steam-valves and with the ring N on the eccentric M, substantially as described, for the object set forth.

2. The combination of the arbor T, having the screw *e* and toe *g*, with the crank pin G of the eccentric M, the shaft F, the sleeve J, the pistons D D^1 D^2, the cylinders B B^1 B^2, and the central exhaust-chamber A, as and for the purpose described.

In testimony that I claim the foregoing I have hereunto set my hand and seal this 9th day of October, 1876.

A. S. CAMERON. [L. S.]

Witnesses:
W. HAUFF,
E. F. KASTENHUBER.