2 Sheets—Sheet 1.

W. N. De GROAT.

Rotary-Engine.

No. 224,999. Patented Mar. 2, 1880.

Fig. 2.

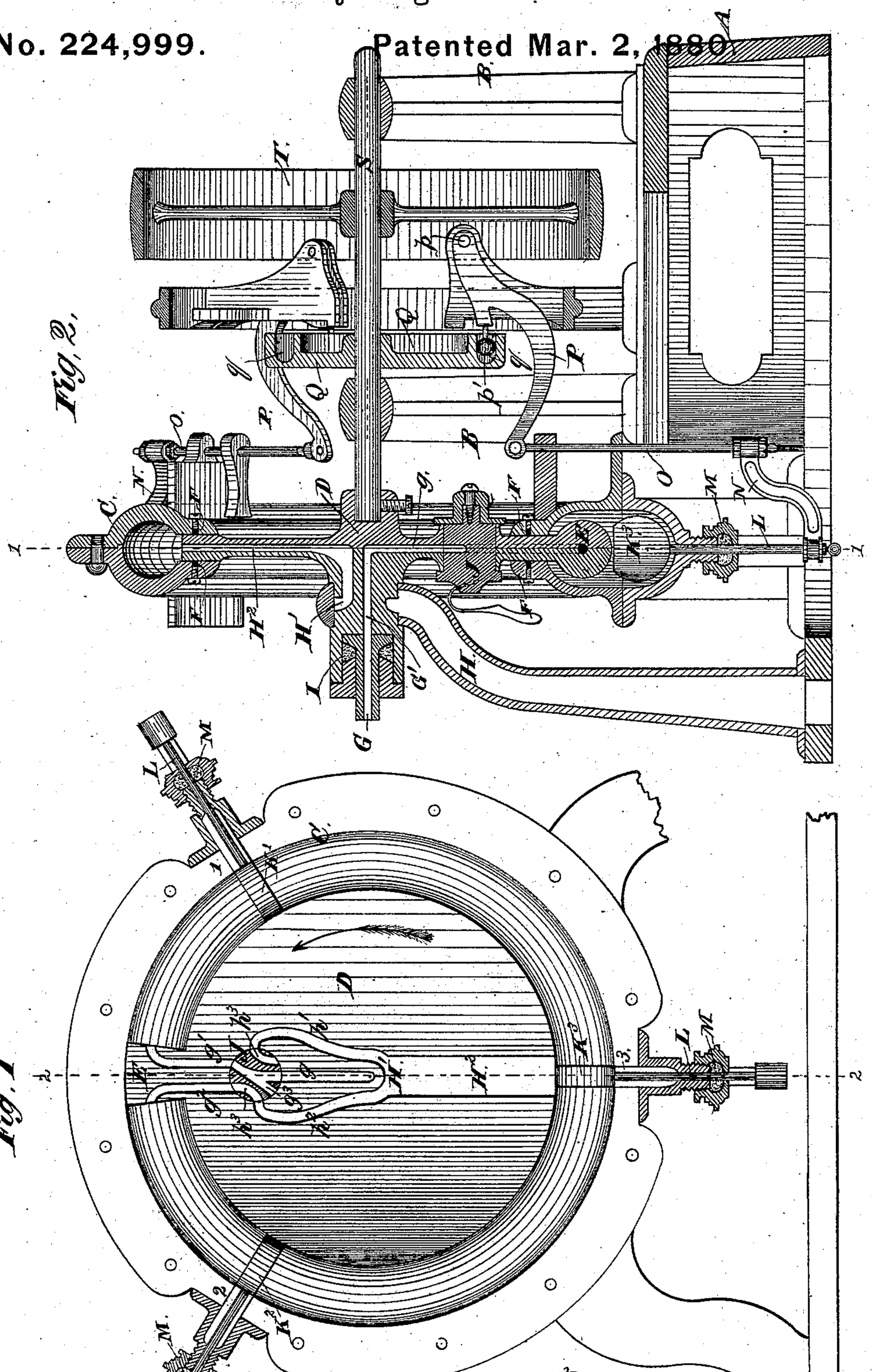


Fig. 1.

Attest.

Walter Allen

Geo. T. Smallwood Jr.

Inventor

William N. De Groat:

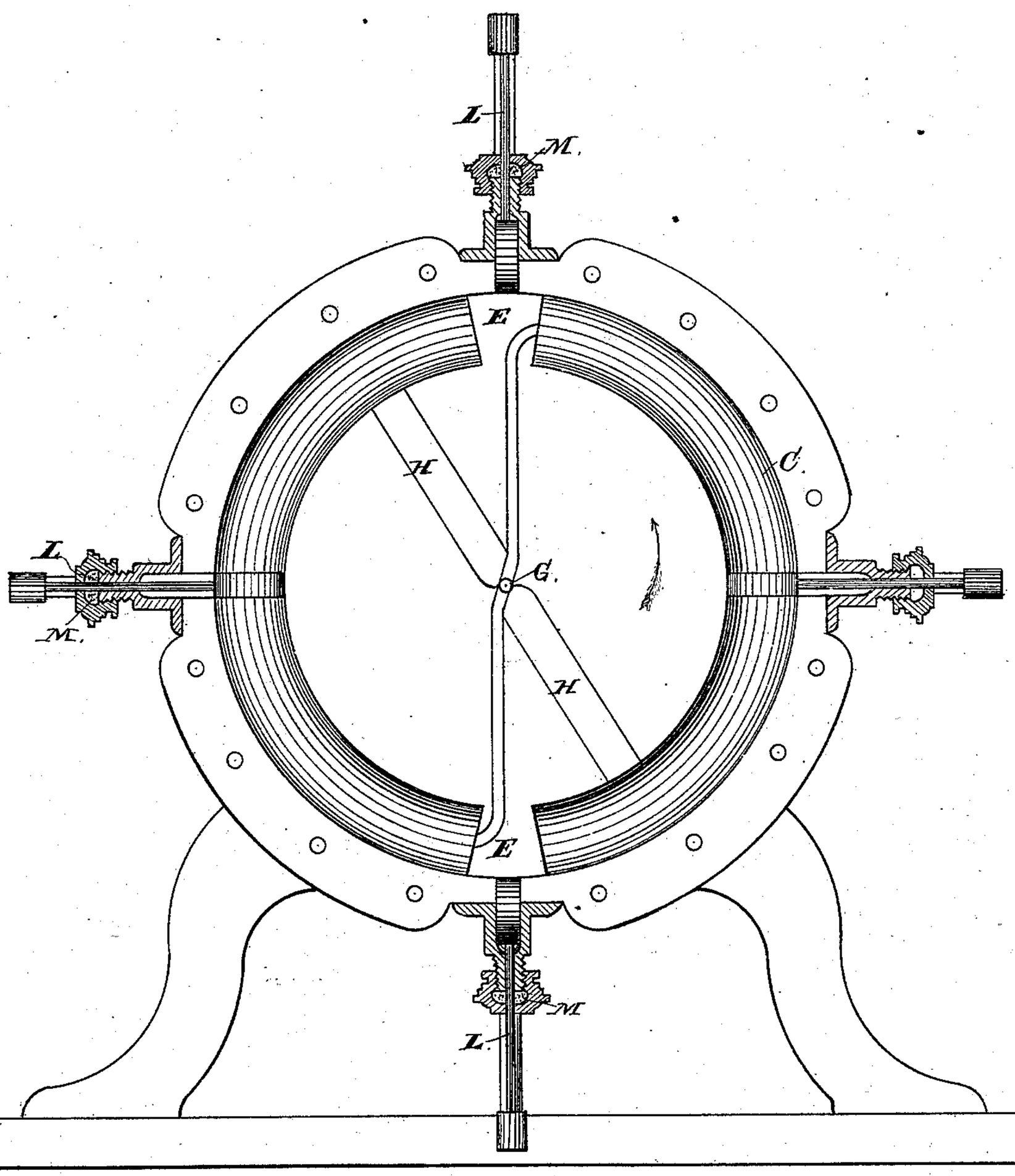
By Knight Bros attys

2 Sheets—Sheet 2.

W. N. De GROAT.
Rotary-Engine.

No. 224.999. **Patented Mar. 2, 1880.**

Fig. 3.



Attest:
Geo. T. Smallwood Jr.
Walter Allen

Inventor:
William N. De Groat.
By. Knight Bros
attys.

UNITED STATES PATENT OFFICE.

WILLIAM N. DE GROAT, OF KNOXVILLE, TENNESSEE, ASSIGNOR OF ONE-HALF OF HIS RIGHT TO A. L. MAXWELL, OF SAME PLACE.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 224,999, dated March 2, 1880.

Application filed January 10, 1879.

To all whom it may concern:

Be it known that I, WILLIAM NELSON DE GROAT, of Knoxville, in the county of Knox and State of Tennessee, have invented certain new and useful Improvements in Rotary Engines, of which the following is a specification.

My engine is constructed with a disk mounted on a shaft and having a piston-head, which works in a stationary annular cylinder so as to impart rotation to the disk and thereby to the shaft.

The steam and exhaust ports enter the disk at or near its center and pass to its periphery in opposite directions, the steam-port communicating with the cylinder through one face of the piston-head, and the exhaust-port at a diametrically-opposite point. The necessary abutments are formed by radially-sliding heads operated by a cam-wheel on the main shaft. The exhaust-port and other parts are so arranged that each sliding head is relieved of pressure before it has to be moved, and it is restored to its place under a pressure which is balanced, with the exception of the small area of the stem by which it is worked.

For a reversing-engine I employ a steam-port on each face of the piston-head and a plug in the disk having connection-ports, which, by turning the plug in either direction, are caused to place either of the said ports in the head in communication with the central steam-port of the disk, and the other with the exhaust-port.

I prefer to use three radially-sliding abutments to a disk having one piston-head. The invention may be used to good advantage with two piston-heads on the rotary disk and a corresponding number of main exhaust-ports intermediately arranged, and with four radially-sliding abutment-heads in the annular cylinder.

In order that my invention may be fully understood, I will proceed to describe it with reference to the accompanying drawings, in which—

Figure 1 is a vertical transverse section of the engine on the line 1 1, Fig. 2. Fig. 2 is a vertical longitudinal section on the line 2 2, Fig. 1. Fig. 3 is a transverse section, showing an engine with two pistons.

A represents a suitable base or bed, on which the standards or pillow-blocks B B and the annular cylinder C are fastened. The main shaft S has its bearings on the pillow-blocks B B, and has keyed on its forward end a disk, D, on which are one or more piston-heads, E, fitting within the annular cylinder C. F F are packing-rings set up against the faces of the disk D in customary manner, in order to confine the steam within the annular cylinder.

G represents the stationary steam-supply pipe, communicating with the center of the disk D, and H the exhaust-pipe, which communicates constantly with an annular exhaust-port, H′, in the disk surrounding the central steam-port, G′, which communicates with the steam-pipe G. The steam-pipe G is confined, and the joint between it and the rotary disk D packed by means of a gland, I. From the central steam-port in the disk a port, *g*, extends radially to a plug, J, by which said radial steam-port is made to communicate with the port g' or g^2, on either side of the piston-head E, according to the direction in which the engine is to run. The other port, g^2 or g', as the case may be, is, by the same adjustment of the plug, placed in communication with the exhaust-port h^2 or h', connecting with the annular exhaust-port H′. The ports in the plug to adapt it to thus control the steam and the movement of the engine are shown in Fig. 1, g^3 being a **Y** or **V** shaped port, to connect the central steam-port, *g*, with either of the ports g' g^2, and h^3 h^3 curved exhaust-ports which connect the other port, g^2 or g', with the exhaust-port h^2 or h', as before stated.

The main exhaust-port of the disk is shown at H^2. This port is always open, and is located diametrically opposite the piston-head E, where but a single piston is used. If two pistons are used, the respective exhaust-ports are located a short distance in advance of them, as illustrated in Fig. 3; but this arrangement is not suitable for a reversing-engine.

In non-reversing engines, with either one or more pistons, the reversing-plug J and its accessories may be entirely omitted, the stopping and starting being effectually controlled by the throttle.

K′ K^2 K^3 are the radially-sliding abutments,

which are operated by rods L, passing through stuffing-boxes M, and connected, by arms N and rods O, to levers P, fulcrumed at p, and having on their shorter arms spherical friction-rollers p', which travel in the cam-groove q of a wheel, Q, keyed on the main shaft S.

The form of the cam-groove q is such that each radially-sliding head K is withdrawn a short time before the piston E reaches that point in the cylinder, and is closed again directly behind the piston.

It will further appear from the positions of the parts shown in Fig. 1 that each sliding head or abutment is relieved of steam-pressure before the next preceding abutment is retracted for the passage of the piston.

In the position shown in Fig. 1 the main exhaust-port H^2 has just cleared the space from K^3 to K′ of steam, the space from K^2 to K^3 having been cleared as said exhaust-port passed the abutment at K^2. The full steam-pressure is acting between the abutment K′ and the piston-head E.

In Fig. 2 the piston is shown in the opposite position, just passing the lower abutment-head, K^3, said head being retracted to permit it to pass.

The exhaust H may carry off the steam in any preferred direction. The arrangement shown in Fig. 2, whereby it delivers it through the floor, is convenient.

The exhaust-pipe H may be turned in any radial direction.

I prefer to connect the stationary steam and exhaust port with the web near its central part, as described; but this is not essential to the invention.

T shows a driving-pulley on the shaft S.

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

1. The combination of the cylinder C, rotating disk D, having one or more piston-heads, E, the steam-pipe G, in line with the solid shaft S, the central and radial steam-ports G′ g within the rotating disk D, the radially-sliding abutments K′ K^2 K^3, the cam-wheel Q, and the levers P P P, substantially as and for the purposes described.

2. The combination, with the cylinder C, disk D, and piston-head E, of the steam-ports G′ g g' g^2, exhaust-ports H H′ h' h^2, and the plug or valve J, provided with channels g^3 and h^3, and turning on an axis parallel with that of the disk, substantially as and for the purposes set forth.

3. The combination of the cylinder C, solid shaft S, rotary disk D, piston-head E, abutments K′ K^2 K^3, annular exhaust-port H′, and the external radial exhaust-pipe H, communicating directly with said annular exhaust-port H′, substantially as and for the purposes set forth.

WM. N. DE GROAT.

Witnesses:
OCTAVIUS KNIGHT,
WALTER ALLEN.