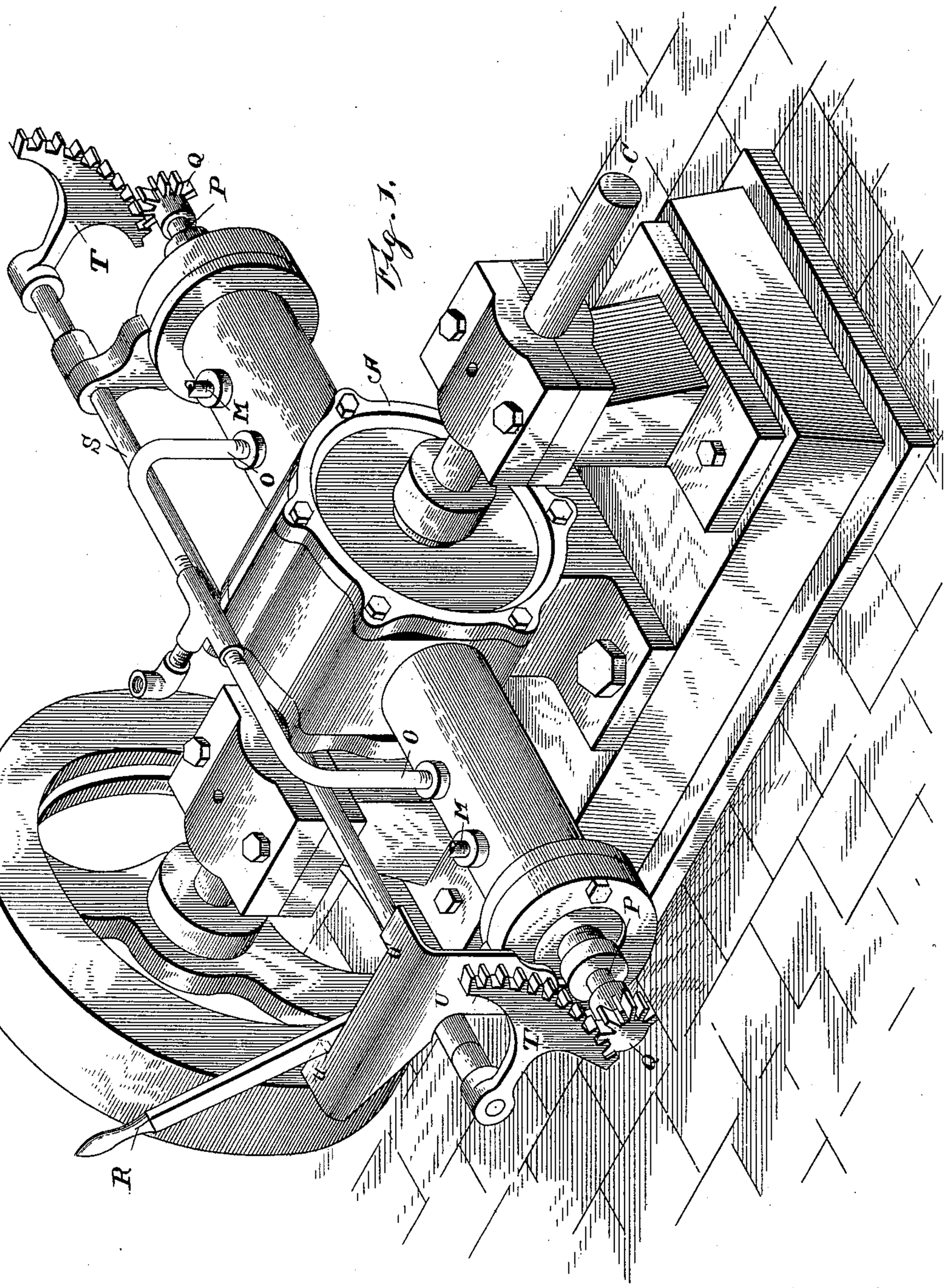
(No Model.)

4 Sheets—Sheet 1.

W. J. PEARCE.

ROTARY ENGINE.

No. 606,080. Patented June 21, 1898.



Witnesses
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Inventor
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Attorney

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(No Model.) 4 Sheets—Sheet 2.

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Fig. 2.

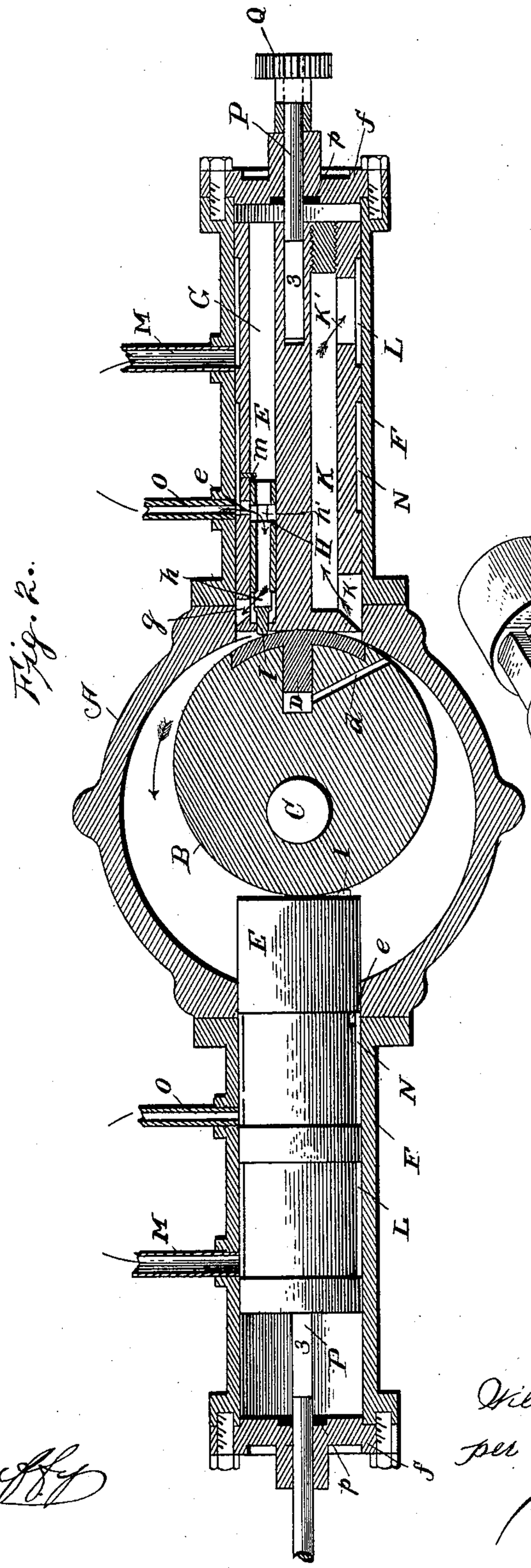
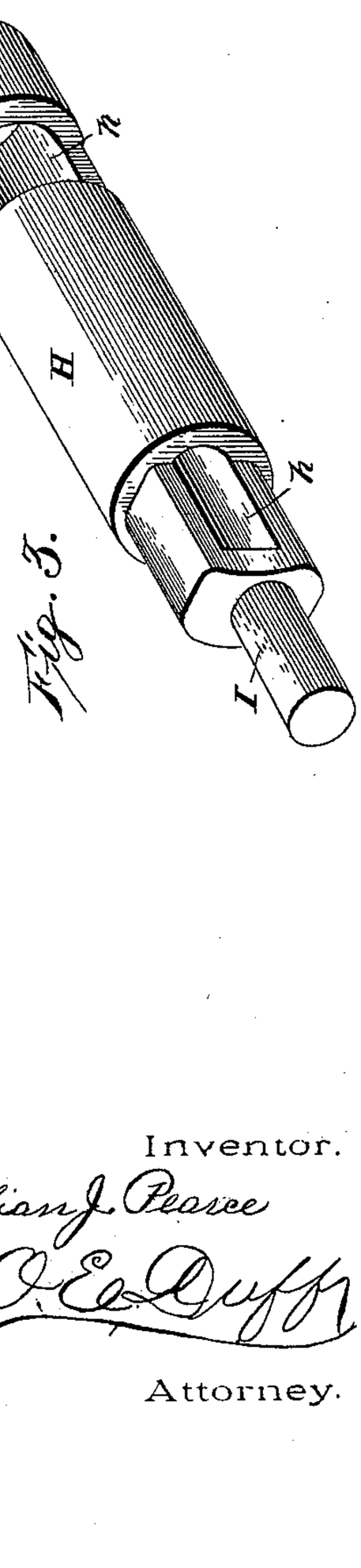


Fig. 3.



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(No Model.) 4 Sheets—Sheet 3.

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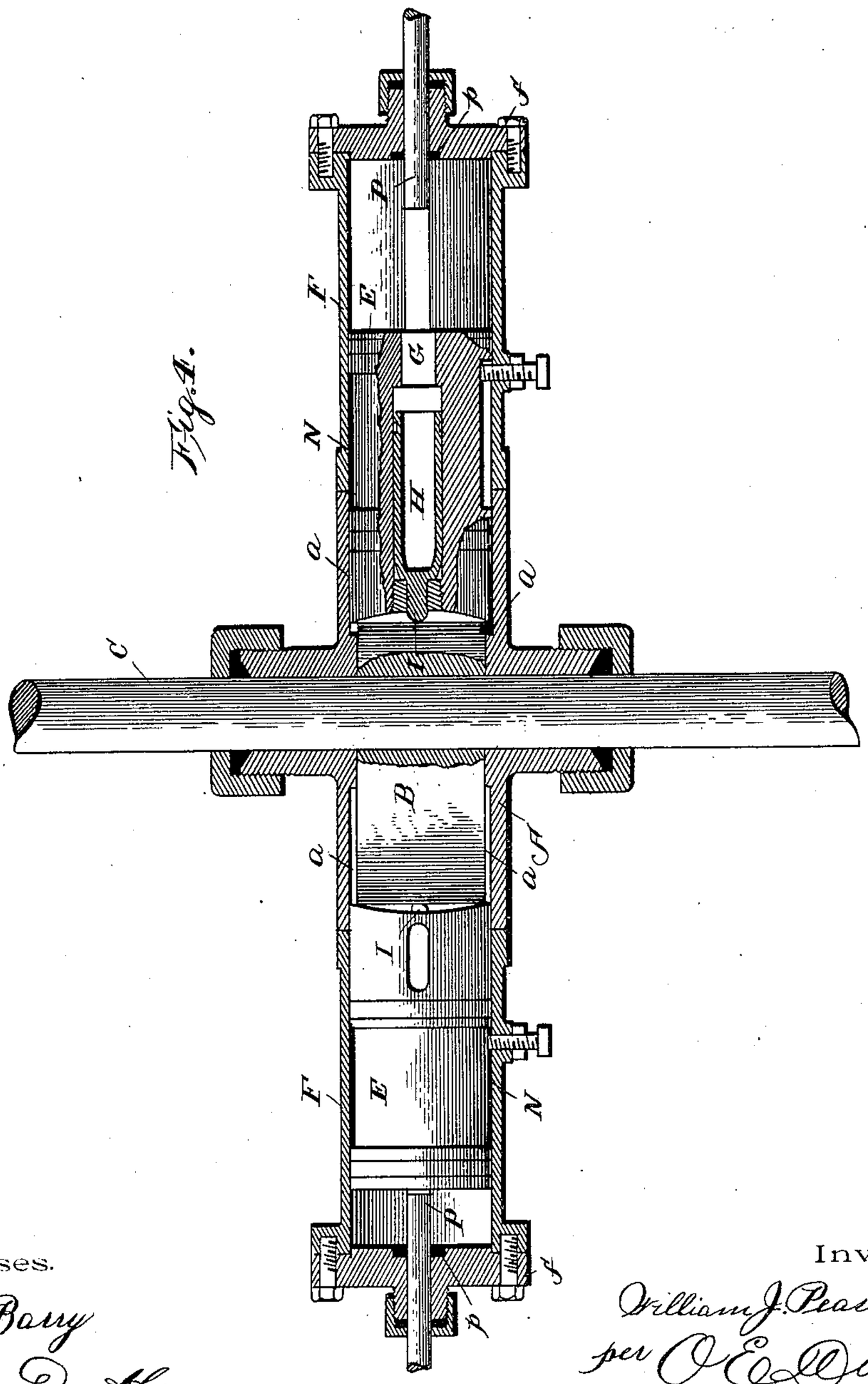
Fig. 4.



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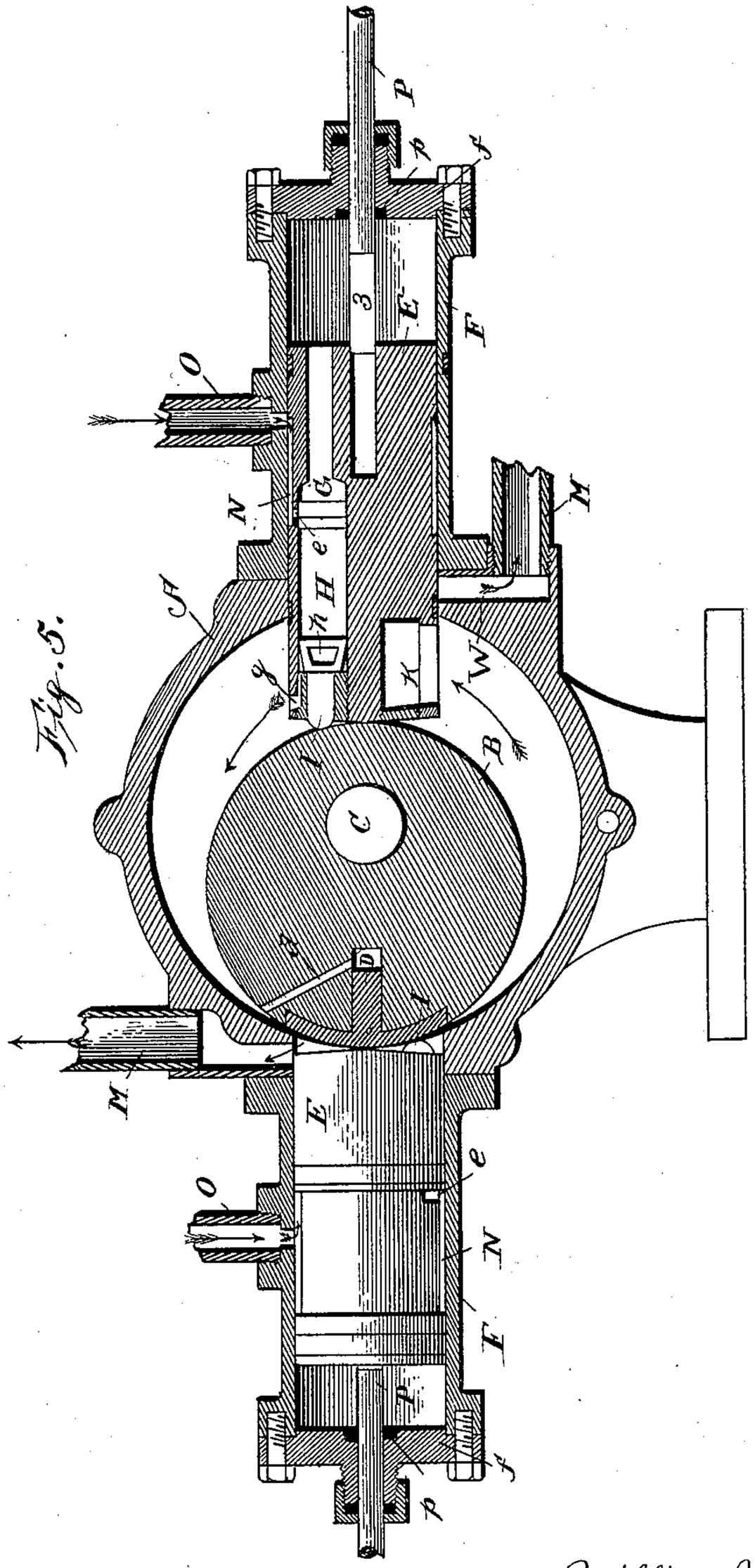

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UNITED STATES PATENT OFFICE.

WILLIAM J. PEARCE, OF CLINTON, INDIANA, ASSIGNOR OF ONE-HALF TO JOHN A. HURTH, OF SAME PLACE.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 606,080, dated June 21, 1898.

Application filed August 19, 1897. Serial No. 648,797. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM J. PEARCE, of Clinton, in the county of Vermilion and State of Indiana, have invented certain new and useful Improvements in Rotary Engines; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form part of this specification.

The invention relates to certain improvements in rotary engines; and it consists in the combination, with a cylinder and a rotary piston, of a sliding rotary abutment having inlet and exhaust ports for steam and in mechanism for operating the abutment and in construction and combination of certain parts of the engine to be hereinafter described, all of which will be pointed out in the claims.

Figure 1 is a perspective view of my improved engine. Fig. 2 is a longitudinal vertical section through the same. Fig. 3 is a detached perspective view of the steam-valve which operates in the abutment, and Figs. 4 and 5 are sectional views of modification of my engine.

A is the cylinder, within which is the rotatable eccentric piston B, secured to the engine-shaft C.

D is the packing-strip, lying in a recess in the face of the piston B, which is set out by any well-known means. In this instance it is set out by steam entering the recess back of the strip through the passage *d*.

Diametrically on each side of the cylinder are two rotatable cylindrical abutments E. Both being identical in form, the description of one will serve for that of both. The abutment operates in cylinders F F, the open ends of which are secured to the main cylinder, while the outer end is provided with a cap or cover *f*. The abutment is provided with a steam-passage G, extending throughout its length, having an inlet-port *e*, and terminating in a port *g* on its periphery near the piston and through which the steam is conveyed to the cylinder. This valve is a cylindrical shell provided with the ports *h h'* and at its outer end with a pin or rod I, the opposite end being open. In operation the valve is pushed in by the revolving piston registering the port *h'* of the valve with the ports 3 of the abutment, permitting the steam to enter the passage G and thence into the cylinder. The port *e* is closed by the outward movement of the valve when the pin I is out of contact with the eccentric piston. An exhaust-passage K is also within the abutment, which terminates in port *k* near the piston end of the abutment and in the port *k'* near the other end, which connects with a recess L, formed around the abutment. This recess connects with the exhaust-pipe M. Another recess N around the said abutment connects with the steam-pipe O. A port P in the abutment, connecting the recess N with the passage G, is controlled by the valve H.

m is a pin projecting into the passage G, which prevents the valve from displacement.

There being two points at which the steam is delivered to the engine, the pipes O O can be connected to a pipe common to both, which leads from the boiler, and the exhaust-pipes may be connected in the same manner to a common exhaust.

The diameter of the abutment is slightly larger than the width of the piston B, and therefore the bore of the abutment-cylinder is the same and extends into the main cylinder, forming a groove on each head. The length of the stroke of the abutment will be seen at *a*, Fig. 4.

Through the head of the abutment-cylinder projects a rod P, which is provided with a collar *p*, which rests in a recess inside of the head. On the outer end of the rod is secured a segmental gear Q, which serves with the collar *p* to prevent any longitudinal motion of the rod, and also to reverse the abutment and thereby reverse the engine, all of which will be explained farther on.

The inner end of the rod P is made square, as at 3, and enters a square opening in the end of the abutment, which can reciprocate over the rod, but is prevented from turning.

The steam entering the passage G not only enters the main cylinder, but also presses on the end of the valve to keep it closed when not in contact with the piston, and by pass-

ing through the open end of passage G into the abutment-cylinder keeps the abutment steam-tight against the piston and also acts as a piston to rotate the main shaft by pressure against the eccentric piston as it revolves. It will be seen that the valve in the abutment will be closed before half a revolution of the eccentric piston has been made, and thereby reduce the pressure back of the abutment, so that on the return stroke of the abutment there is very little resistance offered to the eccentric piston as it returns the said abutment. The steam presses the collar *p* on the rod P to its seat, thereby preventing any leakage past the said rod P.

R is a reversing-lever which is attached to the rod S, upon the ends of which are secured the tooth-segments T T, which mesh with the segmental gear Q on the rods P. A bracket U, secured to the engine and provided with stops *u u*, limits the throw of the reversing-lever R.

The engine is provided with the usual fly-wheel and bearings for the main shaft.

From the foregoing description it will be easy to follow the operation of the engine.

The piston is moved in the direction of the arrow, when it will come in contact with the pin I and open the valve, which permits the steam to pass from the pipe O through the port *h'* in the abutment, and thence through the valve out of the port *h* into the cylinder. It is understood that on moving the piston a short distance the abutment has entered the cylinder, thus opening thereto the steam and exhaust ports. The exhaust from the opposite side of the piston passes through the port *k*, passage K, and port *k'* around the groove L to the exhaust-pipe M.

It will be seen that the pressure of steam and exhaust is balanced as against the abutment, since it is equal around in the grooves.

Each abutment admits steam to one side of the piston and exhaust from the other for half the stroke. It will be noticed that the pin I of the valve H projects from the upper end of one abutment and the lower end of the other. This is so arranged that the eccentric piston in passing over the face of the abutment will not open the valve until the greater diameter of the piston has passed the abutment, permitting the steam to act thereon.

To reverse the engine, the lever R is pushed over, which operates the gear on the rods P, and thereby turns the abutment one-half a revolution, bringing the steam-port in the reverse position of that shown in the drawings.

In Figs. 4 and 5 the abutments have only the steam-groove N, which connects with the ports and passage G, the same as Fig. 2; but the exhaust is conducted through a short recess which connects with the port W and the exhaust-pipe M, one of which is above and below the cylinder.

The face of the abutment which comes in contact with the piston is made slightly angular. This causes the valve to open a little later in the revolution of the piston.

It is evident several modifications may be made without departing from the spirit of my invention.

Having described my invention, what I claim is—

1. In a rotary engine the combination of a piston with an abutment, provided with steam and exhaust ports, being actuated directly by the piston and rotatable to reverse the engine, substantially as shown and described.

2. In a rotary engine the combination of the eccentric piston, the reciprocating rotatable abutment provided with steam and exhaust ports and operated directly by the piston, and means for rotating the abutment to reverse the engine, substantially as shown.

3. In a rotary engine the combination of an eccentric piston, an abutment provided with a steam-valve projecting therefrom and operated directly by the piston and an exhaust-passage in the abutment, substantially as shown and described.

4. In a rotary engine the combination of the piston with an abutment provided with steam and exhaust passages, a longitudinally-fixed reversing-rod upon which the abutment can reciprocate extending into the same, and means for rotating the rod to reverse the engine.

5. In a rotary engine the combination of a piston with an abutment provided with a valve in its steam-passage, a projection on the end of the same, upon which the piston acts to operate it.

6. In a rotary engine the combination of a piston with an abutment provided with grooves connecting with the steam and exhaust pipes, and with steam and exhaust passages, the steam-passage having a steam-valve projecting therefrom and operated directly by the piston.

7. In a rotary engine the combination of the eccentric piston, the ported abutment which is provided with a square recess in its outer end, a square-ended rod entering the recess and provided with a collar which seats against the abutment-cylinder head and means for turning the rod.

8. In a rotary engine the combination of the ported abutment, the rod entering the same, and projecting beyond the abutment-cylinder head, a segmental gear on the end of the rod, a reversing-lever connected to a shaft, and a segmental gear on the shaft meshing with the gear on the rod, whereby the engine is reversed.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

WILLIAM J. PEARCE.

Witnesses:
WILLIAM M. HAMILTON,
JOHN A. WILTERMOOD.