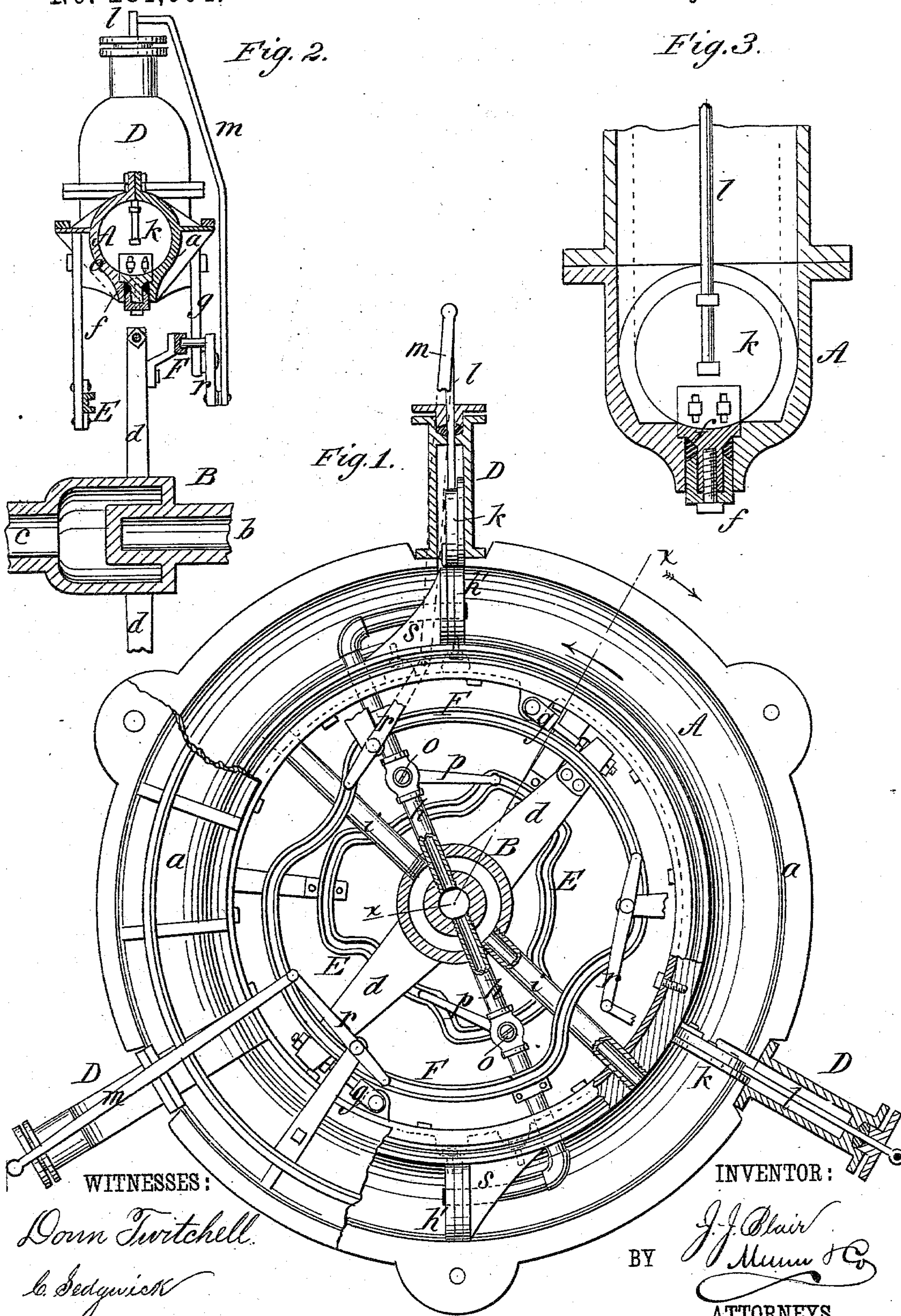


(No Model.)

J. J. BLAIR.  
ROTARY ENGINE.

No. 281,004.

Patented July 10, 1883.



WITNESSES:

Down Twitchell.  
C. Sedgwick

INVENTOR:

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# UNITED STATES PATENT OFFICE.

JOHN J. BLAIR, OF TOCOMA, WASHINGTON TERRITORY.

## ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 281,004, dated July 10, 1883.

Application filed August 30, 1882. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN J. BLAIR, of To-  
coma, in the county of Pierce and Territory of  
Washington, have invented a new and Im-  
proved Rotary Engine, of which the following  
is a full, clear, and exact description.

My invention relates to the class of rotary  
engines employing pistons in connection with  
an annular steamway; and the invention con-  
sists in certain novel features of construction  
and arrangement of parts, especially in the  
means of supplying steam for the operation of  
the valves and gates, as hereinafter described  
and claimed.

Reference is to be had to the accompanying  
drawings, forming a part of this specification,  
in which similar letters of reference indicate  
corresponding parts in all the figures.

Figure 1 is a side elevation of my improved  
rotary engine, the case being broken open and  
certain parts made in section, in order to show  
the interior construction. Fig. 2 is a trans-  
verse section on line *x x*, Fig. 1. Fig. 3 is a  
detail section in larger size.

A is a hollow ring or annular steamway,  
which is formed by the two rings *a a*, which  
are bolted together, and are also made with  
flanges for their attachment to a suitable sup-  
port.

B is the shaft, which is formed hollow and  
provided with an interior partition, as shown  
in Fig. 2, so as to separate the ends of the shaft,  
one end, *b*, being for the inlet of steam and the  
other end, *c*, for the exhaust.

*d d* are arms projecting from the shaft B at  
opposite sides.

At its inner periphery the hollow ring form-  
ing the steamway is formed with a continuous  
slot, and in this slot is a slide-ring, *f*, which  
connects by means of links *g* to the arms *d d*  
of the shaft. This ring *f* is packed in the slot  
by means of a packing-gland, as shown in Figs.  
2 and 3. The pistons *h' h'*, of which there are  
two, are connected with the ring *f*. The steam-  
pipes *h* extend from opposite sides of the shaft  
through the slide-ring *f* and project into the  
steamway in front of the pistons, and from that  
point they are continued to and through the  
pistons, so as to discharge the steam behind  
the pistons. The exhaust-pipes *i i* pass from

the hollow shaft and connect with the steam-  
way through apertures in the ring *f*.

Exteriorly of the steamway are the valve  
cases or boxes D, which are three in number  
and placed equidistant.

The valves or gates K are of circular form,  
as shown in Fig. 3, and are formed with rab-  
beted edges to fit in slots formed in the boxes  
D, which serve to guide the valves in their  
movement. The valves are attached upon the  
ends of the stems *l*, which extend through stuff-  
ing-boxes at the outer ends of the boxes D,  
and are connected to links *m*, by which the  
valves are operated by cams, as hereinafter  
described.

In the steam-pipes *h* are rotary throttle-  
valves *o*, on the stems of which are arms *p p*.  
Attached upon arms projecting from the hol-  
low ring A is a grooved cam, E, the groove of  
which is engaged by friction-rollers upon the  
ends of the valve-arms *p*, so that the cam serves  
to open and close the valves at the proper time.  
F is a second grooved cam, which is attached  
to arms from shaft B, and this cam engages  
one end of levers *r*, that are also connected to  
the rods *m* of the valves or gates *k*. Both cams  
E and F are shaped to open the steam-valves  
and move the gates *k* at the proper time, and  
in the engine shown, using two pistons, these  
valves are opened and closed three times in  
each rotation.

By the arrangement of parts shown the steam  
is cut off at the half-stroke of each piston, so  
that the piston runs one-half the time by ex-  
pansion of the steam, and while one piston is  
moving by expansion the other is under full  
pressure. The slide valves or gates are moved  
at a time when there is no pressure upon them.

In the operation of the engine, as one piston  
reaches a gate the gate is drawn back and the  
piston passes, moving at that time by expan-  
sion, and after the piston has passed the gate  
the latter closes, and at the same moment the  
exhaust-pipe *i* in advance of this piston is car-  
ried past the next gate, thereby relieving the  
pressure from the second gate, and the steam-  
valve being opened at the same time to admit  
steam behind the first piston. That piston  
then moves forward under full pressure, while  
the piston following is moving by expansion.



An alternate operation by direct pressure and by expansion is thus obtained upon each piston in succession, and a continuous pressure and rotary motion obtained.

5 This engine will develop a comparatively large amount of power for the steam used. In order to strengthen the pistons, they are formed at their forward sides with braces S, to support them against the steam-pressure.

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

1. The combination, with the hollow ring A, slotted on the inside, the pistons  $h'$ , and the hollow shaft B, having arms  $d$ , of the packed  
15 slide-ring  $f$ , connected by links with said arms, the live-steam pipes  $h$ , and the exhaust-pipes  $i$ , as shown and described.

2. The combination, with the valve-stems  $l$  and links  $m$ , of the shaft B, having arms provided with grooved cam F, and the levers  $r$ ,  
20 whereby the gates may be operated as described.

3. The combination of the hollow ring or steamway A, the sliding gates  $k$ , the pistons  $h'$ , the hollow shaft B, the steam and exhaust  
25 pipes  $h$   $i$ , the cams E F, and the connections for operating the gates and steam-valves, substantially as described, for operation as set forth.

4. The combination of the hollow ring or  
30 steamway A, the pistons  $h'$ , the steam-pipe  $h$ , hollow axle B, steam-valve  $o$ , and fixed cam E, operating the steam-valve, substantially as shown and described.

5. In a rotary engine, the combination, with  
35 a fixed steamway, of a hollow axle for supplying the steam, a fixed cam operating the steam-valves, and a revolving cam operating the sliding gates of the steamway, substantially as shown and described.

JOHN J. BLAIR.

Witnesses:

SAML. C. HOWES,  
S. O. ALLTON.