

No. 743,443.

PATENTED NOV. 10, 1903.

E. W. BULL.
ROTARY ENGINE.

APPLICATION FILED FEB. 16, 1903.

NO. MODEL.

3 SHEETS—SHEET 1.

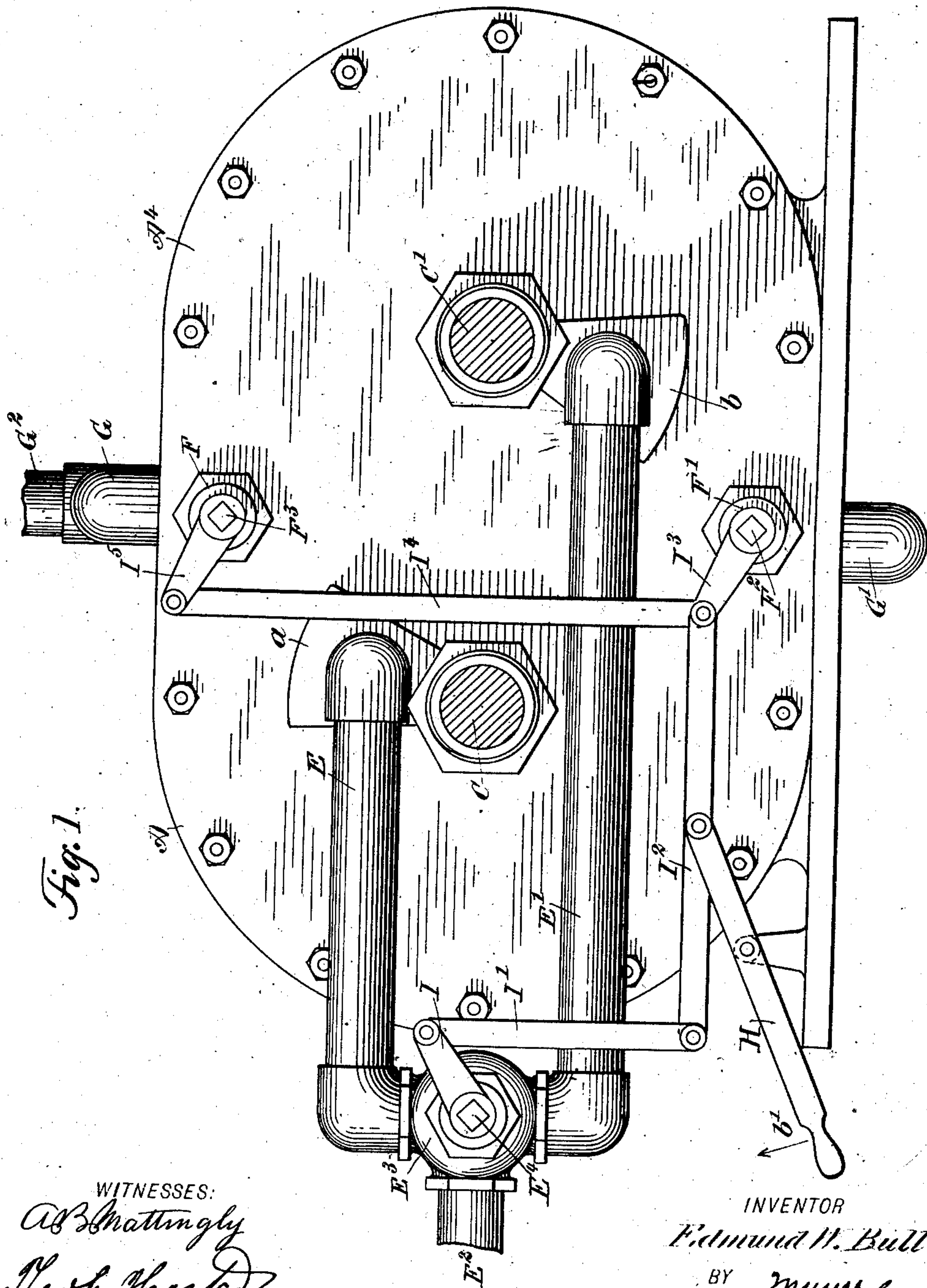


Fig. 1.

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3 SHEETS—SHEET 2.

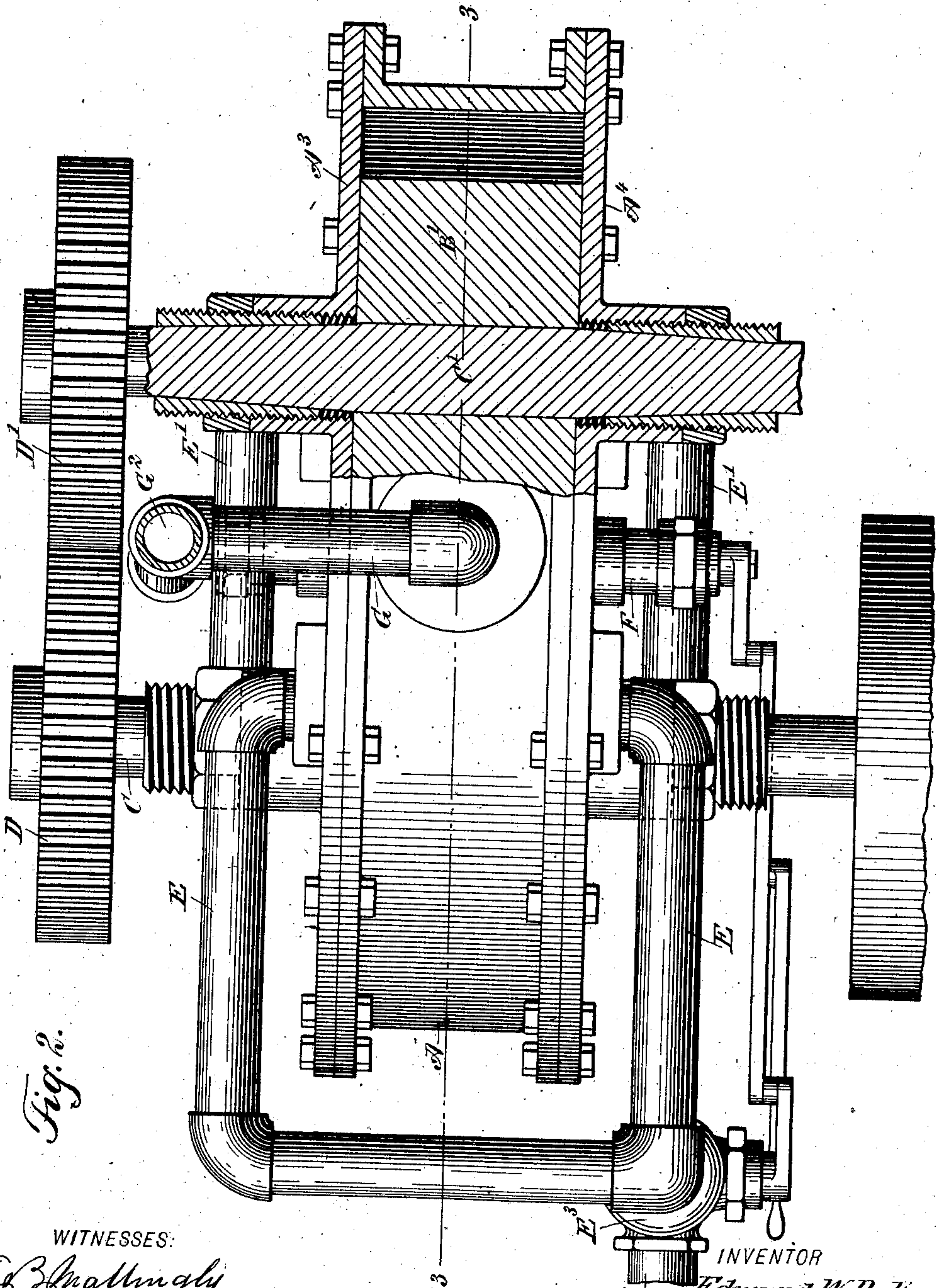


Fig. 2.

WITNESSES:

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3 SHEETS—SHEET 3.

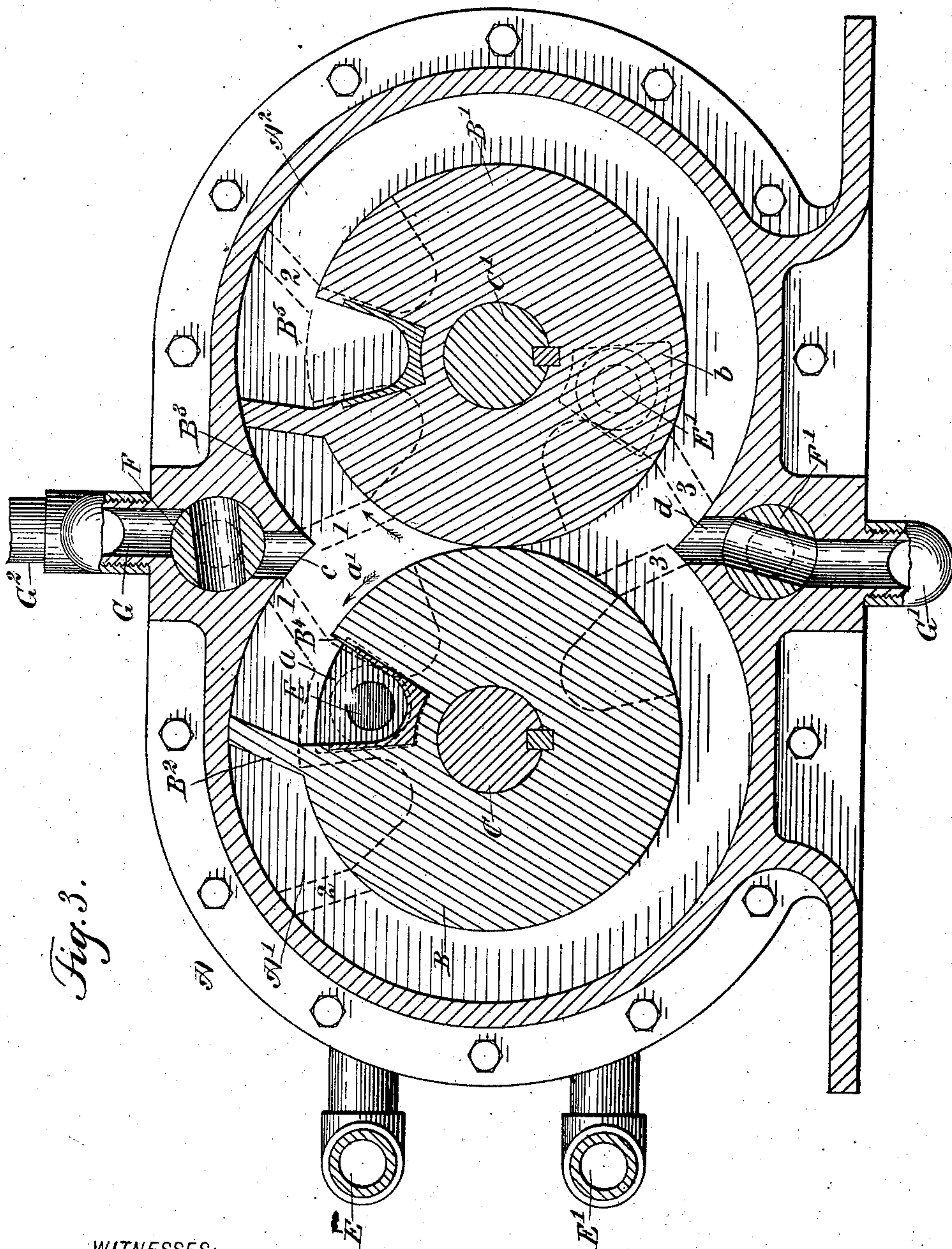


Fig. 3.

WITNESSES:

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UNITED STATES PATENT OFFICE.

EDMUND W. BULL, OF COBOURG, CANADA.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 743,443, dated November 10, 1903.

Application filed February 16, 1903. Serial No. 143,510. (No model.)

To all whom it may concern:

Be it known that I, EDMUND W. BULL, a subject of the King of Great Britain, and a resident of Cobourg, in the Province of Ontario and Dominion of Canada, have invented a new and Improved Rotary Engine, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved rotary engine which is simple and durable in construction, very effective in operation, not liable to easily get out of order, readily reversed, and arranged to utilize the motive agent to the fullest advantage.

The invention consists of novel features and parts and combinations of the same, as will be more fully described hereinafter and then pointed out in the claim.

A practical embodiment of the invention is represented in the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a side elevation of the improvement, showing the shafts in section. Fig. 2 is a plan view of the same, parts being in section; and Fig. 3 is a sectional side elevation of the same on the line 3 3 of Fig. 2.

The cylinder A of the rotary engine is formed with two intersecting bores A' and A², in which are mounted to rotate cylindrical pistons B and B' in rolling contact with each other at their peripheral surfaces, as plainly illustrated in Fig. 3, the said pistons B and B' being secured on shafts C and C', journaled in suitable bearings arranged on the heads A³ and A⁴ of the cylinder A, as plainly indicated in Fig. 2.

The shafts C and C' are connected at their outer ends with each other by gear-wheels D and D', so that the shafts and their pistons B and B' rotate in unison. The pistons B and B' are provided with piston-heads B² and B³, respectively, arranged adjacent to peripheral recesses B⁴ and B⁵, formed in the pistons B and B' and extending from one end to the other up to the inner faces of the cylinder-heads A³ and A⁴. The piston-heads B² and B³ are so arranged relative to the recesses B⁴ and B⁵ that when the pistons B and

B' are rotated the piston-head B² passes into the recess B⁵ and the piston-head B³ passes into the recess B⁴ to allow the piston-heads to pass each other at the intersecting point of the bores A' and A². The ends of the recess B⁴ are adapted to register with ports a, formed in the cylinder-heads A³ and A⁴ and connected with steam-inlet pipes E, and similar ports b are formed in the cylinder-heads A³ and A⁴ for the recess B⁵ to register with the said ports b the same as the recess B⁴ registers with the ports a. The ports b are connected with inlet-pipes E', and the said inlet-pipes E and E' are connected with a common supply-pipe E², leading to a boiler or other suitable source of steam-supply, and in the said supply-pipe E² between the inlet-pipes E and E' is arranged a valve E³ for directing the live steam from the supply-pipe E² to the pipes E or E', according to the direction in which the engine is to turn.

In the cylinder A at the junction of the bores A' and A² are engaged exhaust-ports c and d, adapted to be opened and closed by manually-controlled valves F and F', connected with exhaust-pipes G and G', leading to a common exhaust-pipe G².

When the engine is to run in the direction of the arrow a', (indicated in Fig. 3,) then the valve F' in the exhaust-port d is open, while the valve F in the exhaust-port c is closed and the valve E³ is in such a position that the live motive agent passes from the pipe E² through the pipes E and ports a to the recess B⁴ and into the cylinder at the time the said recess is in register with the ports a.

When it is desired to reverse the engine, then the valve F is opened and the valve F' is closed and the valve E³ is turned, so as to cut off steam from the pipes E and to connect the supply-pipe E² with the pipes E'.

Now when the several parts are in the position illustrated in the drawings and the piston-heads B² and B³ are in the position indicated in dotted lines (marked 1 1) then the recess B⁴ is just registering with the ports a, so that live steam can pass through the ports a into the recess B⁴ and between the two piston-heads B² and B³ to rotate the pistons B and B' in the direction of the arrow a'. Now during this rotation of the pistons

B and B' the recess B⁴ moves over the ports *a*, thus allowing live steam still to enter the cylinder A to turn the piston-heads and pistons in the direction described, and when the
 5 ports *a* are finally closed by the piston B then the steam works expansively in the cylinder against the piston-heads B² B³ (see dotted position 2.2) until the piston-heads finally pass the open exhaust-port *d*, (see dotted po-
 10 sition 3 3,) so that the motive agent now escapes from the cylinder through the said open exhaust-port.

When the valves E³, F, and F' are reversed, as above described, then the live motive
 15 agent passes through the ports *b* and the recess B⁵ into the cylinder to act on the piston-heads B² B³ and turn the pistons B and B' in the inverse direction of the arrow *a'*. The operation is the same as above described
 20 only that the pistons turn in the reverse direction and the exhaust takes place through the port *c*, which is now opened by the valve F, while the other exhaust-port *d* is closed by its valve F'.

During the time the piston-heads B² and B³ travel from the open exhaust-port to the starting position the engine runs by its acquired momentum—that is, steam is only admitted to the cylinder after the piston-
 30 heads have passed each other and the corresponding recess B⁴ or B⁵ has made connection at its ends with the ports *a* or *b*.

In order to set the valves E³, F, and F' simultaneously from a single lever H under the
 35 control of the operator, I provide the following device, special reference being had to Figs. 1 and 2: On the stem E⁴ of the valve E³ is secured an arm I, pivotally connected by a link I' with a bar I², pivotally connected
 40 with the lever H under the control of the operator. The bar I² is pivotally connected with an arm I³ on the stem F² of the valve F', and the said bar and arm I³ are pivotally connected by a link I⁴ with an arm I⁵, secured on
 45 the stem F³ of the valve F. Now when the operator imparts a swinging motion to the hand-lever H in the direction of the arrow *b'* then the mechanism described causes a turning of the valves E³, F, and F', so that the
 50 valve E³ connects the supply-pipe E² with the pipes E', while the valve F moves into an open

position and the valve F' into a closed position.

From the foregoing it will be seen that the steam entering the cylinder acts simultane- 55
 ously on the heads B² and B³, so as to force the steam in opposite directions, whereby the force of the motive agent is utilized to the fullest advantage. It will also be seen that the recesses B⁴ and B⁵ serve the double pur- 60
 pose of allowing the piston-heads B² B³ to pass each other and to conduct the live motive agent from the admission-ports *a* or *b* into the cylinder to act on the piston-heads as de-
 65 scribed.

It is understood that the outer ends of the piston-heads B² and B³ are in contact with the inner surface of the bores A' and A², and suitable packing may be employed in the ends of the said piston-heads to prevent leak- 70
 age of steam from one side of a piston-head to the other.

Having thus described my invention, I claim as new and desire to secure by Letters Patent— 75

A rotary engine comprising a cylinder having intersecting bores, and provided with duplicate ports each adapted as an inlet for a motive-power agent, and also provided with other duplicate ports, each adapted as an ex- 80
 haust for such agent, and provided with a valve, each valve provided with an arm, pistons working in said bores, a main supply-pipe for said agent, and inlet-pipes therefrom in communication with said first-named ports, 85
 a valve intermediate said supply and inlet pipes, provided also with an arm, a link in movable connection at one end with this arm, a bar movably connecting said link with the arm of one of the valves first mentioned, an- 90
 other link similarly connecting this last-named arm with the corresponding arm of the other of the said first-named valves, and an operating-lever.

In testimony whereof I have signed my 95
 name to this specification in the presence of two subscribing witnesses.

EDMUND W. BULL.

Witnesses:

H. G. BOLSTER,
 T. M. ROSS.