

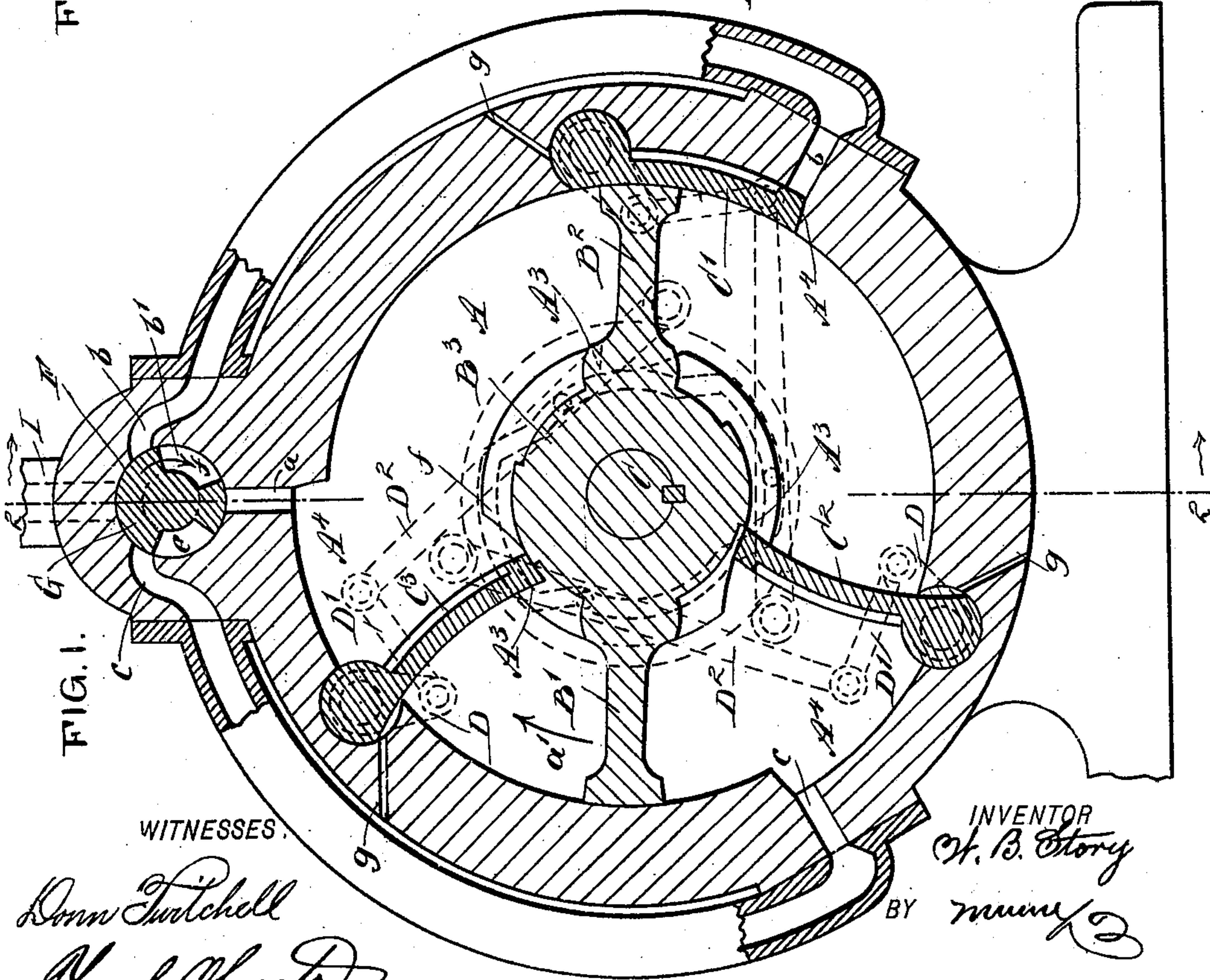
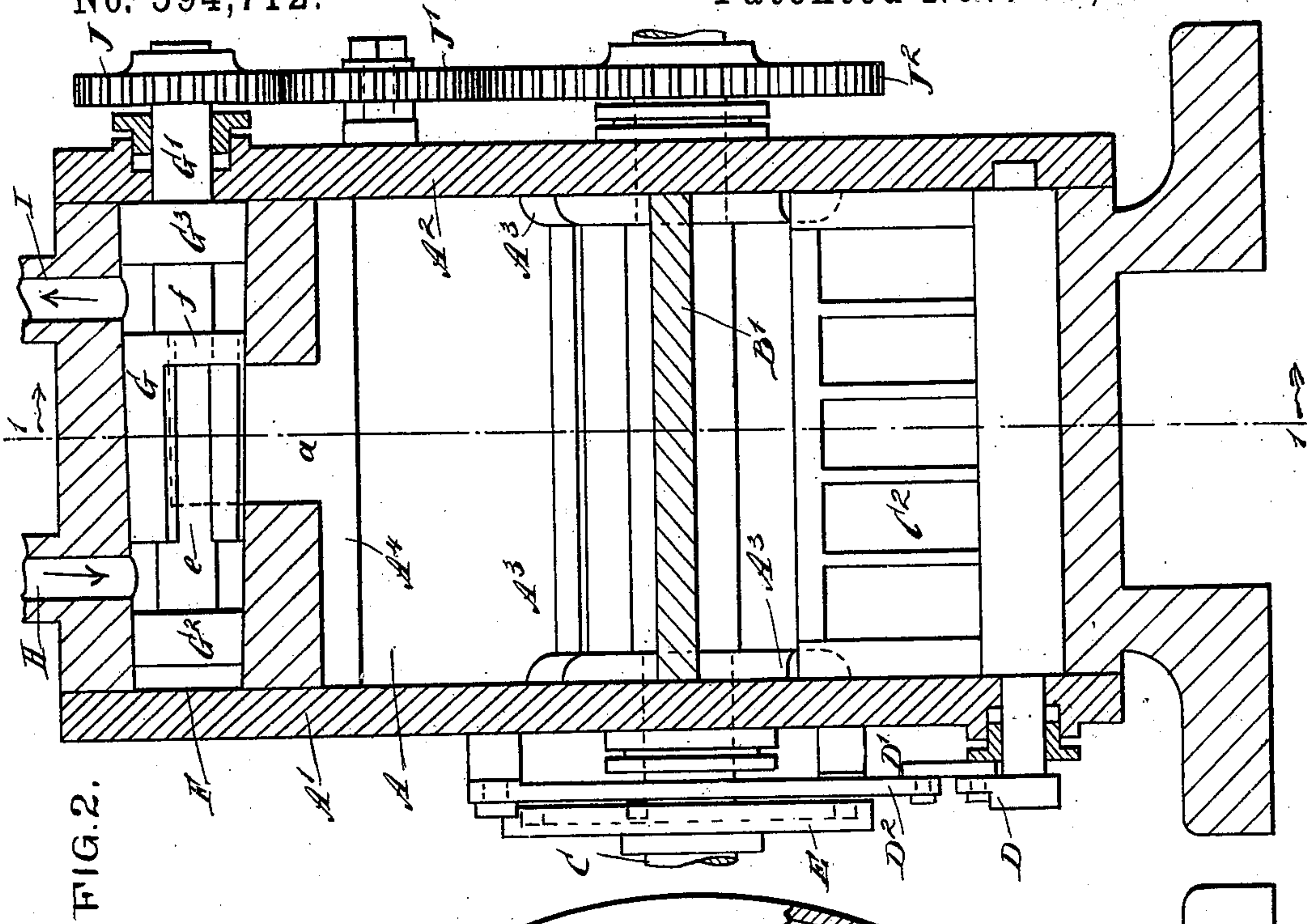
(No Model.)

2 Sheets—Sheet 1.

W. B. STORY.  
ROTARY ENGINE.

No. 594,712.

Patented Nov. 30, 1897.



WITNESSES.

*Donn Twitchell*  
*Rev. J. H. H. H.*

INVENTOR  
*W. B. Story*  
BY *Wm. H. H.*  
ATTORNEYS.



(No Model.)

2 Sheets—Sheet 2.

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FIG. 4.

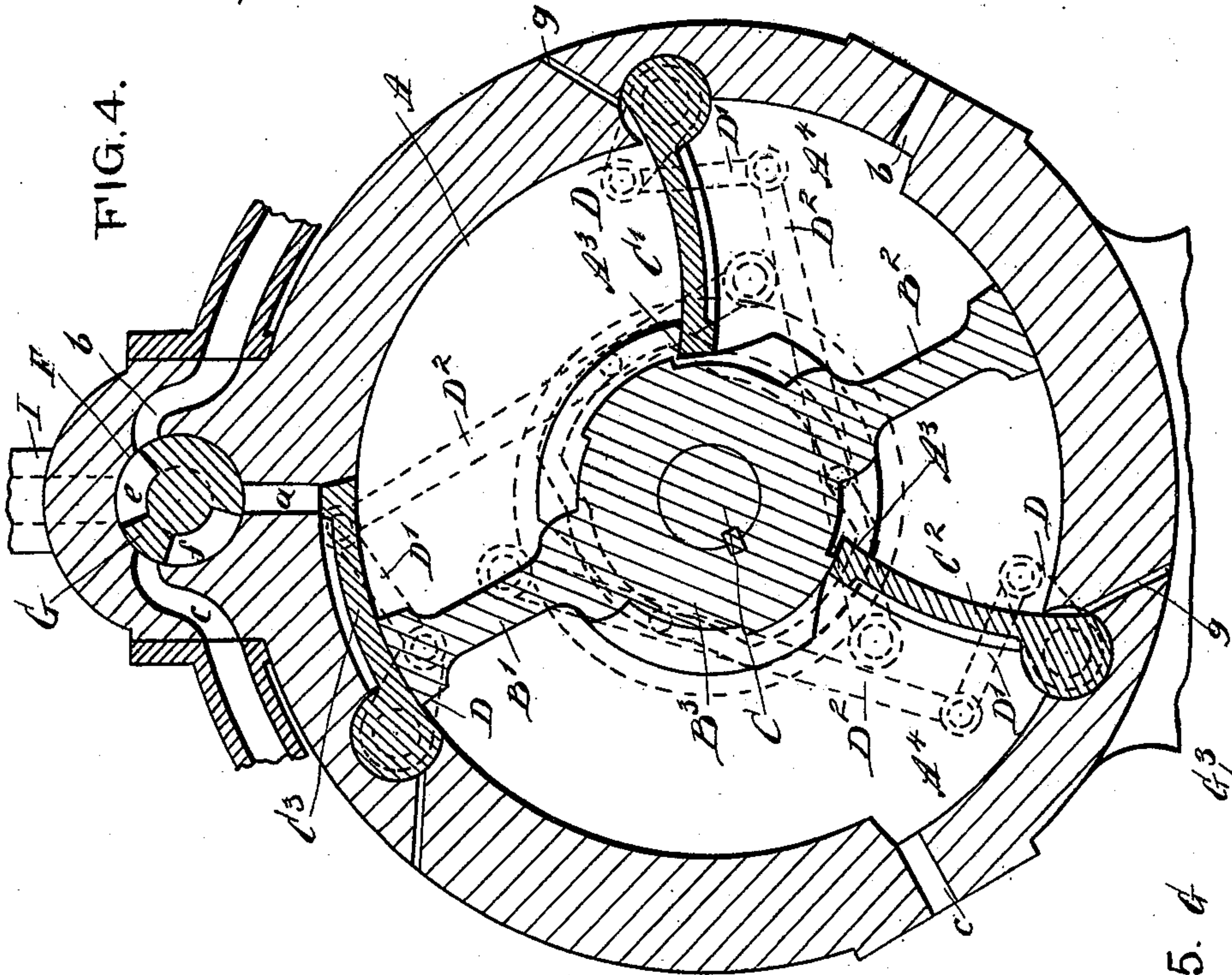
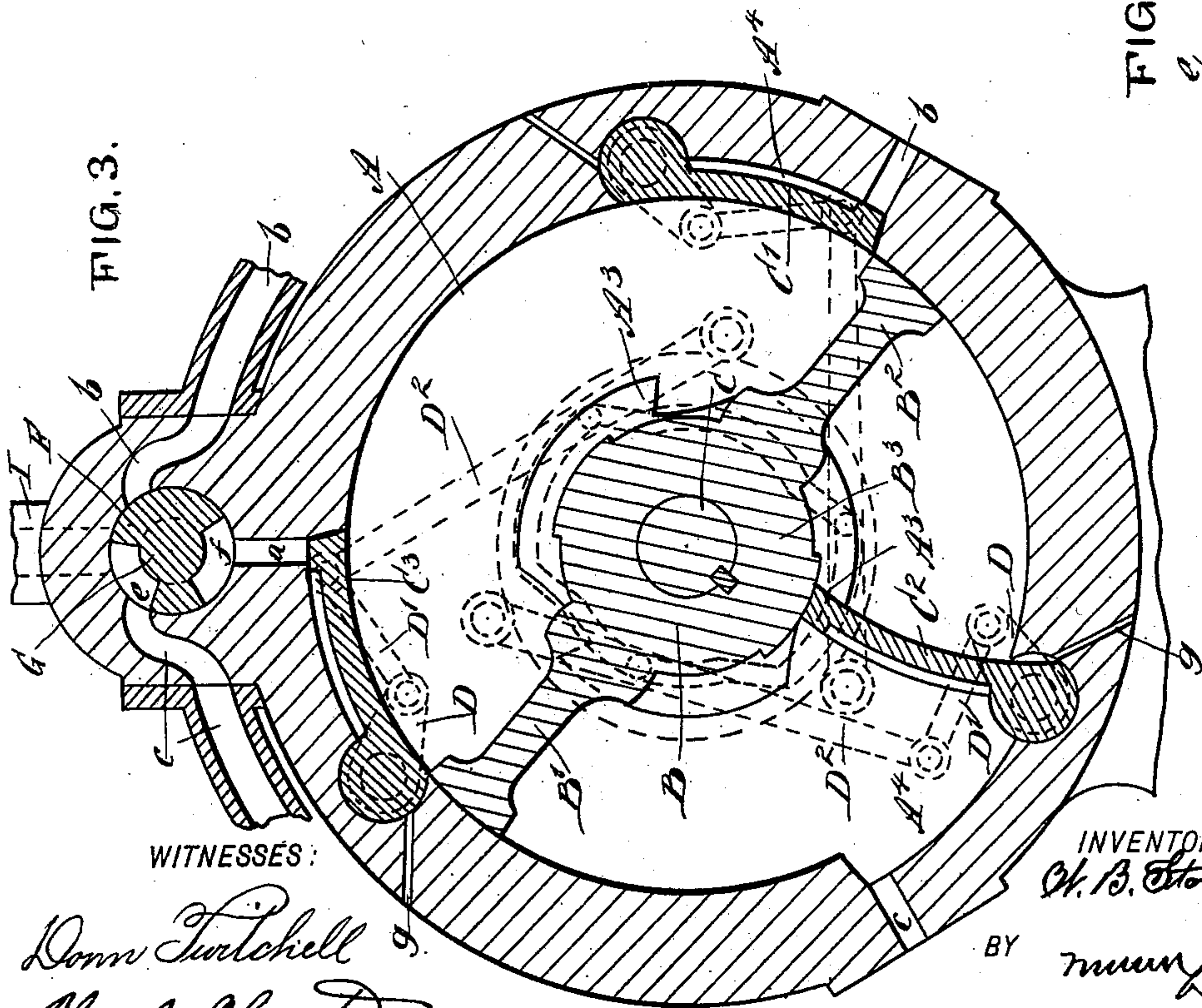


FIG. 3.



WITNESSES:

Donn Tutchell  
Geo. G. Foster,

INVENTOR

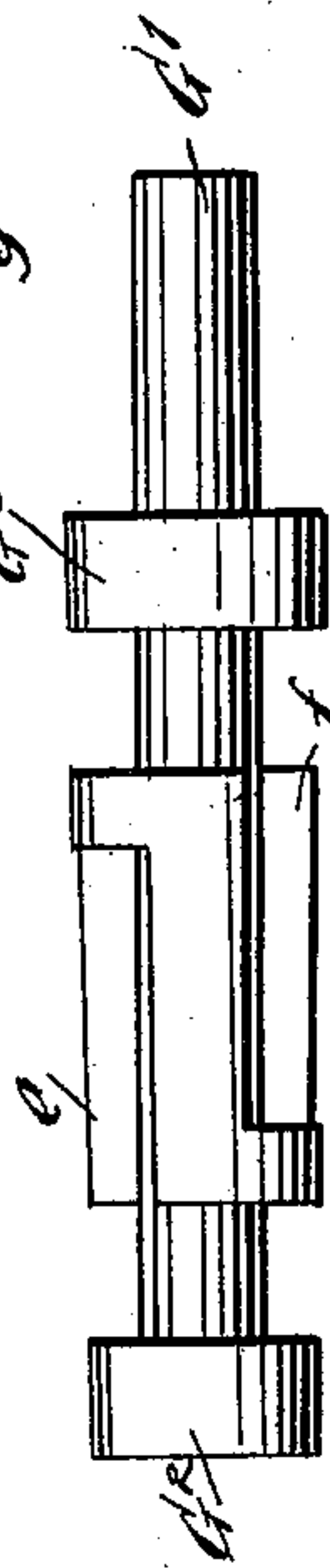
W. B. Story

BY

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ATTORNEYS.

FIG. 5.





# UNITED STATES PATENT OFFICE.

WARD B. STORY, OF FREEHOLD, NEW YORK.

## ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 594,712, dated November 30, 1897.

Application filed April 14, 1897. Serial No. 632,111. (No model.)

*To all whom it may concern:*

Be it known that I, WARD B. STORY, of Freehold, in the county of Greene and State of New York, have invented a new and Improved Rotary Engine, of which the following is a full, clear, and exact description.

The invention relates to rotary engines such as shown and described in the application for Letters Patent of the United States, Serial No. 630,496, filed by me on April 3, 1897.

The object of the present invention is to provide a new and improved rotary engine arranged to utilize the steam expansively to produce the best possible results without waste of motive agent.

The invention consists principally of a cylinder, a piston having a plurality of piston-heads, a series of movable abutments in the said cylinder, and a rotary valve connected with the supply and with an exhaust and adapted to connect with a series of ports leading into the said cylinder, each port forming alternately an inlet and an exhaust port.

The invention also consists of certain parts and details and combinations of the same, as will be fully described hereinafter and then pointed out in the claims.

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

Figure 1 is a sectional side elevation of the improvement on the line 1 1 of Fig. 2. Fig. 2 is a longitudinal sectional elevation of the same on the line 2 2 of Fig. 1. Figs. 3 and 4 are sectional side elevations of the improvement with parts in different positions, and Fig. 5 is a plan view of the rotary valve.

The improved rotary engine is provided with a cylinder A, in which is mounted to turn a piston B, provided with a plurality of piston-heads B' B<sup>2</sup>, arranged diametrically opposite each other and secured on a hub B<sup>3</sup>, attached to the main driving-shaft C, journaled in suitable bearings in the heads A' and A<sup>2</sup> of the cylinder A. In the wall of the cylinder A are fulcrumed abutments C' C<sup>2</sup> C<sup>3</sup>, mounted to swing into the working chamber of the cylinder to abut with their free ends on shoulders A<sup>3</sup>, formed on the heads A' and A<sup>2</sup>, and the said abutments receive a positive swinging motion from the driving-shaft C by

crank-arms D, links D', levers D<sup>2</sup>, and an eccentric E, as fully shown and described in detail in the application above referred to, so that further description of this particular mechanism is not deemed necessary.

The abutments C' C<sup>2</sup> C<sup>3</sup> are adapted to swing into recesses A<sup>4</sup>, formed on the inner surface of the cylinder A, to allow the piston-heads B' and B<sup>2</sup> to pass as the piston rotates in the direction of the arrow a'. Into the recesses A<sup>4</sup> open the ports a, b, and c, adapted to be closed by the free ends of the abutments C', C<sup>2</sup>, and C<sup>3</sup>, respectively, when the latter are in an outermost or folded position, and the said ports open into a steam-chest F, containing a rotary valve G and connected with a steam-supply H and an exhaust I. The rotary valve G has the outer end of its shaft G' provided with a gear-wheel J in mesh with an intermediate gear-wheel J', journaled on a stud secured to the head A<sup>2</sup>, and this intermediate gear-wheel J' is in mesh with a gear-wheel J<sup>2</sup>, secured on the main driving-shaft C. The gear-wheels J, J', and J<sup>2</sup> are so proportioned that one revolution of the shaft C, and consequently that of the piston B, produces two revolutions of the valve G. The latter is provided in its peripheral surface with the ports e and f, adapted to register successively with the ports a c b, and the port e leads to one end of the valve G to connect at all times with the supply H, while the other port f leads in the opposite direction to connect at all times with the exhaust I, as will be readily understood by reference to Figs. 2 and 5. The port e is thus the steam-inlet port and f the exhaust-port. A small port g leads to the seat or fulcrumed end of each abutment from the outside of the cylinder, so that an escape is provided for any steam left in a compartment between a piston-head and the following abutment after the corresponding exhaust-port is closed, so that no undue compression of steam or air takes place in the cylinder.

The operation is as follows: When the several parts are in the position as illustrated in Figs. 1 and 2 and the piston B rotates in the direction of the arrow a' and the valve G revolves in the direction of the arrow b', the steam-inlet port e is about to connect with the port c to allow live steam to pass from the



supply H, through the ports *e c*, into the cylinder A, between the abutment C<sup>2</sup> and the piston-head B', to cause the live steam to act on the said piston-head to turn the piston in the direction of the arrow *a'*. Shortly after the ports *e* and *c* are connected with each other the ports *f* and *a* are brought into communication to allow the steam contained in the cylinder A, between the abutment C<sup>3</sup> and the piston-head B<sup>2</sup>, to escape by way of the said ports and exhaust I. The abutment C' is in an outermost or folded position for the piston-head B<sup>2</sup> to pass, and any steam left in the cylinder A between the said piston B<sup>2</sup> and the abutment C<sup>2</sup> can escape through the seat for the said abutment and the corresponding port *g*. Now when the piston B advances to the position shown in Fig. 3 the cam E will impart a swinging motion to the abutment C', so that the latter moves into a folded position, as illustrated in Fig. 3, the ports *e* and *c* being then fully connected with each other to still use live steam under boiler-pressure in the cylinder between the abutment C<sup>2</sup> and the piston-head B'. The port *a* is now closed by the abutment C<sup>3</sup>, and the piston-head B<sup>2</sup> has now passed the abutment C', and the latter now swings out of its folded position into a working position, as illustrated in Fig. 4. When this takes place, the ports *e* and *c* are disconnected and the port *e* is about to connect with the port *b* to allow the live steam to pass into the cylinder between the abutment C' and the piston-head B<sup>2</sup> to give another impulse to the piston in the direction of the arrow *a'*. The cylinder between the abutment C<sup>2</sup> and the piston-head B now operates expansively against the head B' until the port *f* registers with the port *c* to connect the said port of the cylinder with the exhaust I by way of the ports *c f*, and any steam or air left in the cylinder between the piston-head B' and the abutment C' can pass out through the seat for the abutment C' and the corresponding port *g*.

Now it will be seen that by the arrangement described the live steam under boiler-pressure acts on one of the piston-heads, while the other piston-head is acted on by the expansive force of the steam already cut off from that particular compartment in the cylinder, while in the remaining compartments of the cylinder the steam can still escape to avoid compression.

It will further be seen that by the arrangement described the valve G in making two revolutions for one revolution of the piston

B connects the live steam six times with the cylinder to give six impulses to the piston at each revolution of the latter, at the same time allowing the steam to act expansively on the piston-heads and also to furnish a proper exhaust of the steam from the corresponding compartments.

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

1. A rotary engine, comprising a cylinder, a piston having a plurality of piston-heads in the same cylinder, a series of movable abutments in the said cylinder, and a rotary valve connected with a supply and an exhaust and adapted to connect with a series of ports leading into the said cylinder and positive rotative connections with the shaft, whereby the rotations of the valve are an even multiple of those of the shaft, substantially as shown and described.

2. A rotary engine, comprising a cylinder having a series of ports forming alternately inlet and exhaust ports, a piston having a plurality of piston-heads in the same cylinder and mounted to turn in the said cylinder, a series of movable abutments in the said cylinder, a steam-chest connected with a supply and an exhaust, and a rotary valve in the said steam-chest having ports, of which one is connected at all times with the supply and the other with the exhaust, the said valve-ports being adapted to register successively with the said cylinder-ports, and rotative connections from the valve to the shaft, substantially as shown and described.

3. A rotary engine, comprising a cylinder having a series of ports forming alternately inlet and exhaust ports, a piston having a plurality of piston-heads and mounted to turn in the said cylinder, a series of movable abutments in the said cylinder, a steam-chest connected with a supply and an exhaust, a rotary valve in the said steam-chest having ports, of which one is connected at all times with the supply and the other with the exhaust, the said valve-ports being adapted to register successively with the said cylinder-ports, and means substantially as described, for rotating the said valve from the piston-shaft in such a manner that the valve makes two revolutions to one revolution of the piston, substantially as shown and described.

WARD B. STORY.

Witnesses:

NATHAN AUGUSTUS,  
IRA F. HUNT.