

No. 771,933.

PATENTED OCT. 11, 1904.

J. H. PUTNAM.
ROTARY ENGINE.

APPLICATION FILED MAR. 18, 1904.

NO MODEL.

2 SHEETS—SHEET 1.

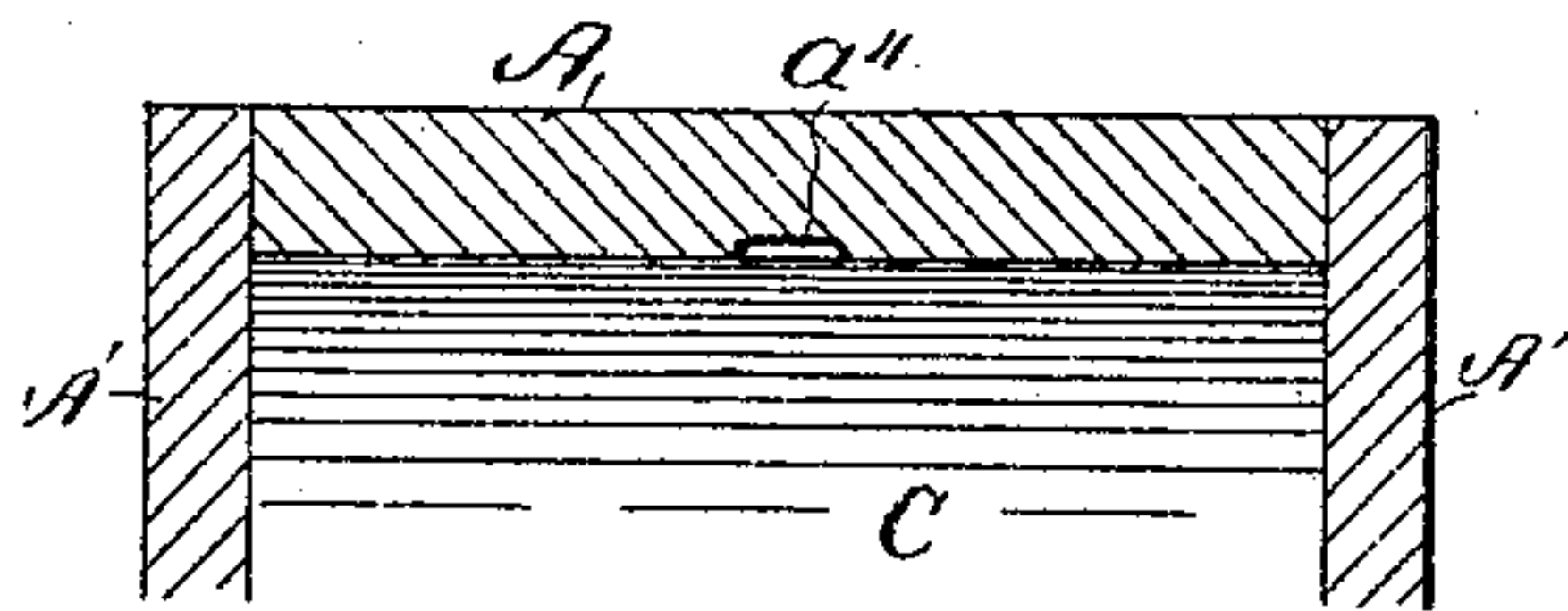


Fig. 7

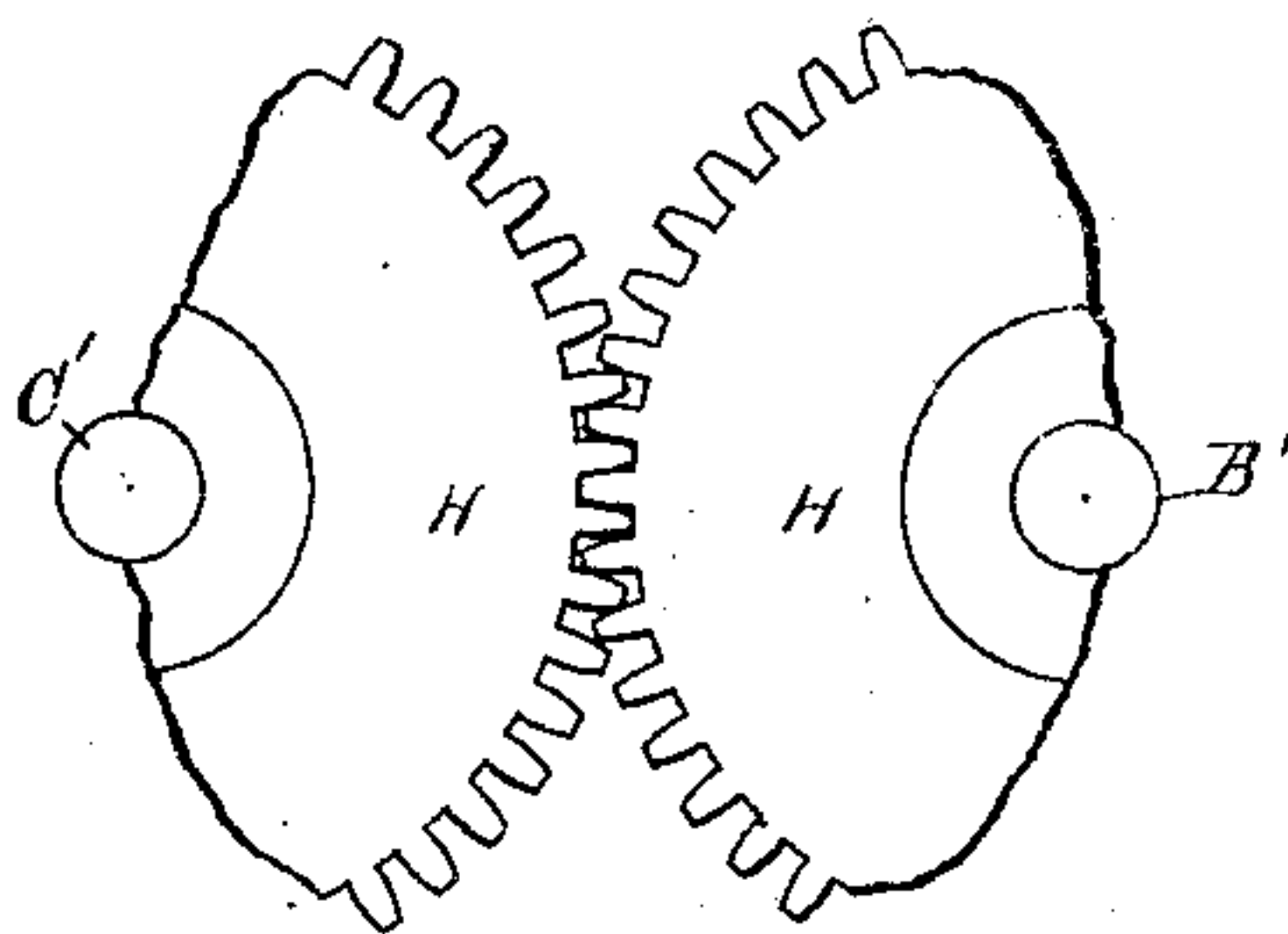


Fig. 6

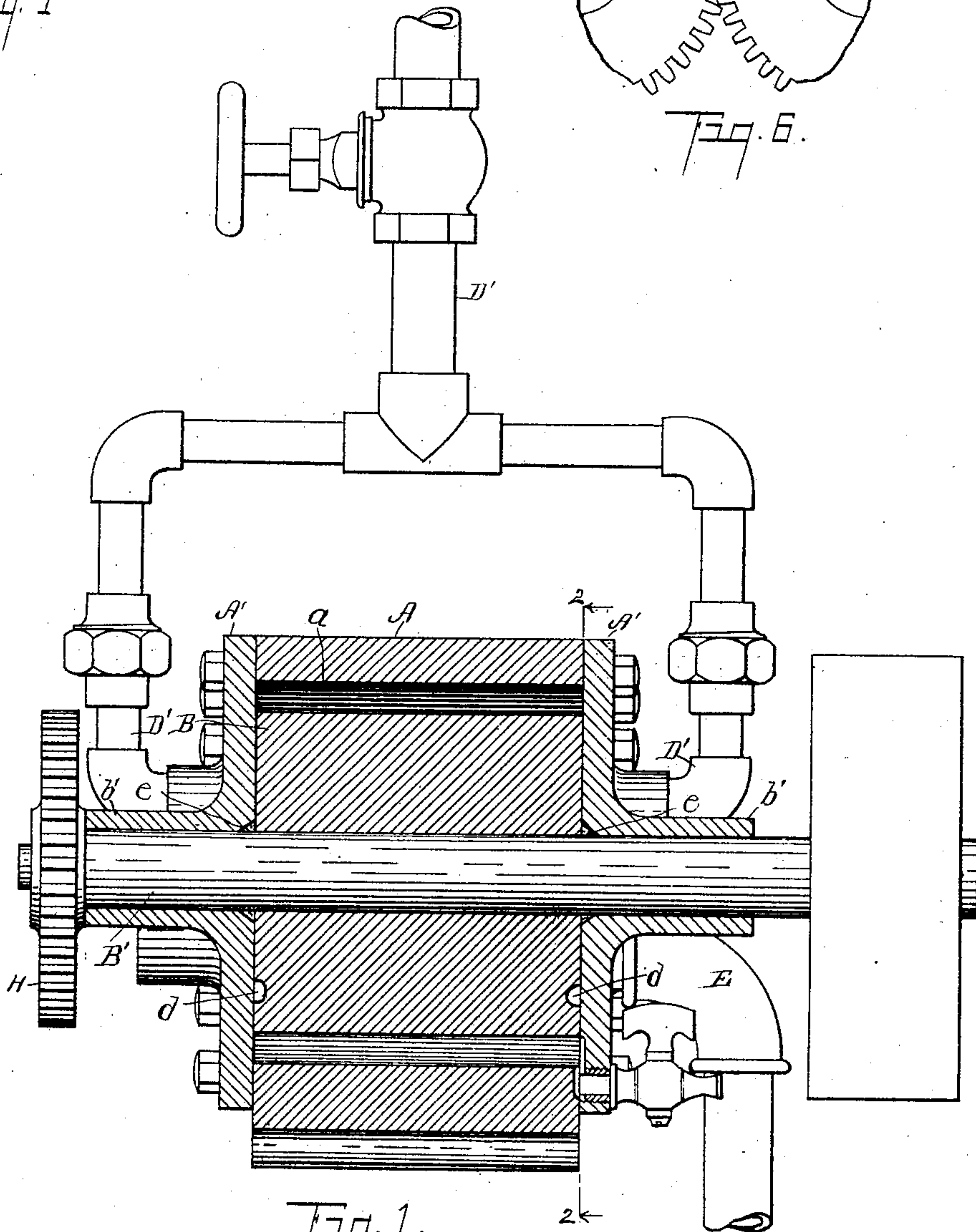


Fig. 1

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No. 771,933.

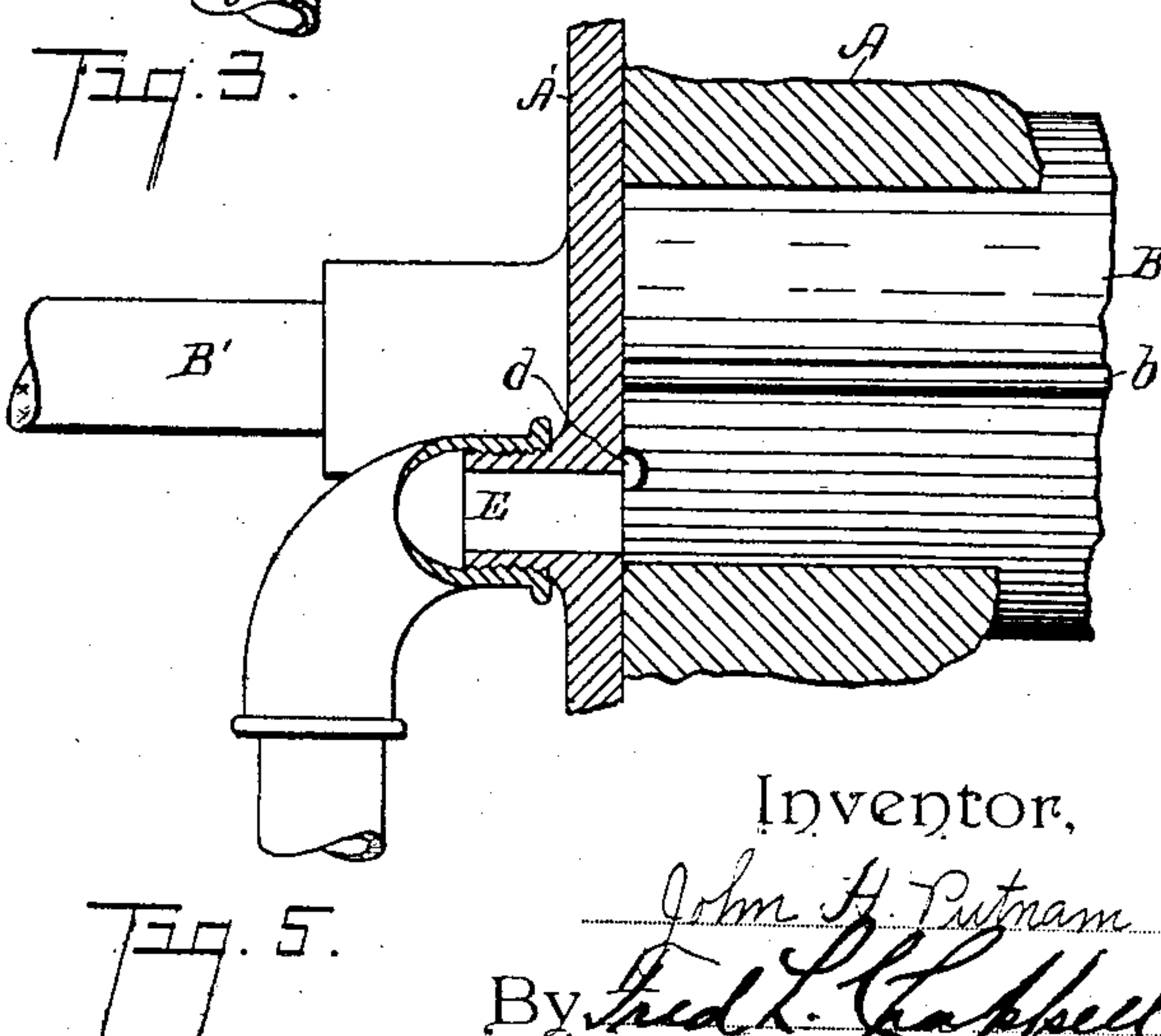
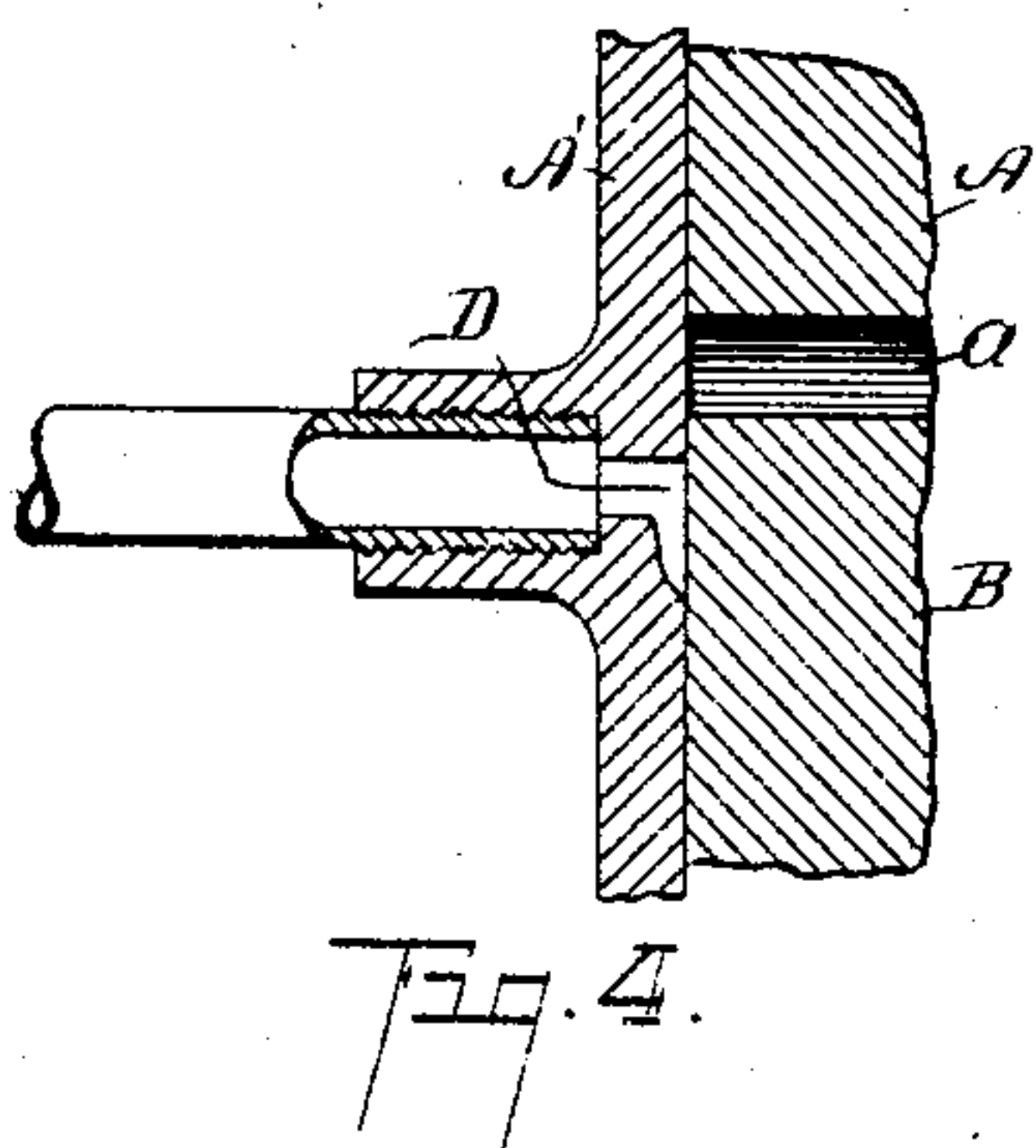
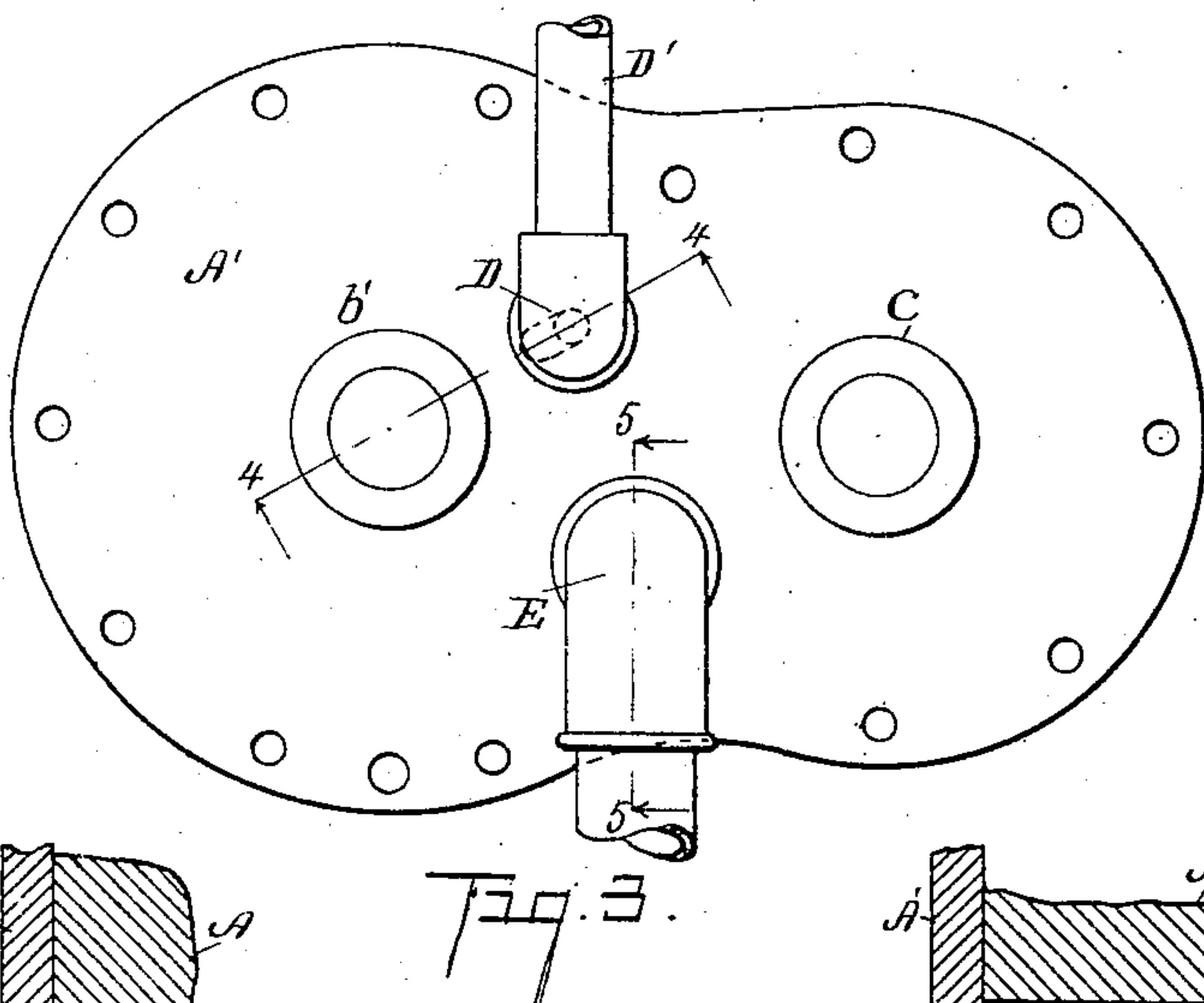
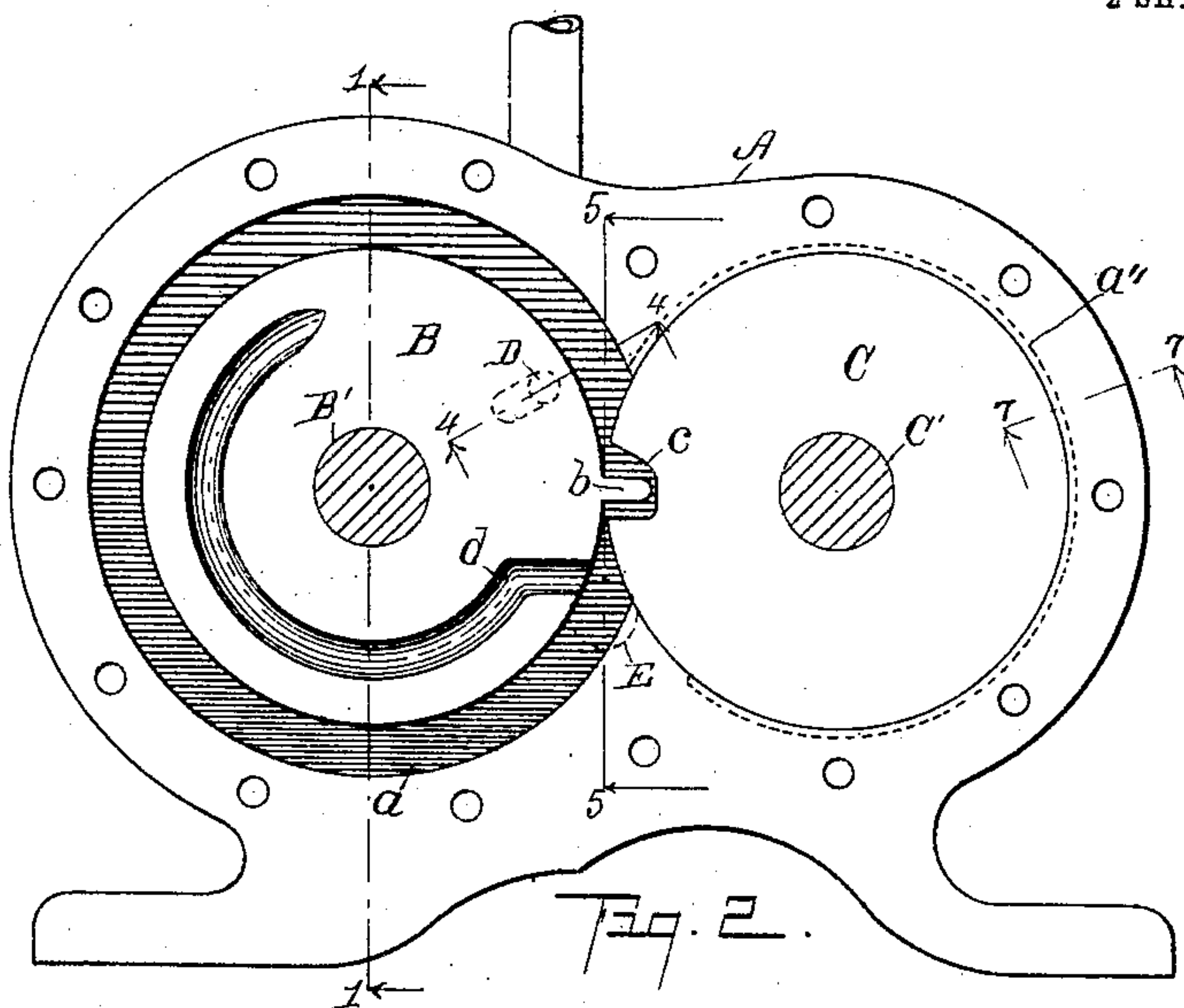
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J. H. PUTNAM.
ROTARY ENGINE.

APPLICATION FILED MAR. 18, 1904.

NO MODEL.

2 SHEETS—SHEET 2.



Witnesses:

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UNITED STATES PATENT OFFICE.

JOHN H. PUTNAM, OF CONSTANTINE, MICHIGAN, ASSIGNOR OF TWO-THIRDS TO WILLIAM H. MASTERMAN AND FRANK P. HOTCHIN, OF CONSTANTINE, MICHIGAN.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 771,933, dated October 11, 1904.

Application filed March 18, 1904. Serial No. 198,843. (No model.)

To all whom it may concern:

Be it known that I, JOHN H. PUTNAM, a citizen of the United States, residing at the village of Constantine, in the county of St. Joseph and State of Michigan, have invented certain new and useful Improvements in Rotary Engines, of which the following is a specification.

This invention relates to improvements in rotary engines.

The objects of this invention are, first, to provide an improved rotary engine in which both the impact and the expansive force of the steam are utilized; second, to provide an improved rotary engine by which very high speed and power can be attained; third, to provide an improved rotary engine adapted to utilize a maximum amount of the power; fourth, to provide an improved rotary engine in which cylinder-valves are dispensed with; fifth, to provide an improved rotary engine which is adapted to run in a very even and in a substantially noiseless manner; sixth, to provide an improved rotary engine which is simple in structure and economical to produce and one which is durable in use and not likely to get out of repair.

Further objects and objects relating to structural details will definitely appear from the detailed description to follow.

I accomplish the objects of my invention by the devices and means described in the following specification.

The invention is clearly defined and pointed out in the claims.

A structure embodying the features of my invention is clearly illustrated in the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a detail vertical transverse sectional view of my improved rotary engine, taken on line 1 1 of Fig. 2, the shaft B' and the steam connections being shown in full lines. Fig. 2 is a detail side elevation view of my improved rotary engine with one of the cylinder-heads A' removed, the shafts B' C' being shown in section. Fig. 3 is a detail plan view of one of the cylinder-heads A'. Fig. 4 is an enlarged detail view taken on line 4 4 of

Fig. 3, showing the relation of the steam-inlet passage to the piston B. Fig. 5 is a detail sectional view taken on line 5 5 of Figs. 3 and 5 through one of the exhaust-ports E. Fig. 6 is a detail side elevation view of the connecting-gear for the shafts C' and B'. Fig. 7 is a detail sectional view taken on line 7 7 of Fig. 2.

In the drawings similar letters of reference refer to similar parts throughout the several views, and the sectional views are taken looking in the direction of the little arrows at the ends of the section-lines.

Referring to the drawings, an engine-cylinder or casing A, having a piston-chamber *a* and an auxiliary chamber *a'* therein which open into each other, is provided. The cylinder A is provided with heads A', detachably secured thereto. These heads A' are provided with suitable outwardly-projecting shaft-bearings *b' c'* for the shafts B' and C', respectively, which are arranged centrally through the cylinder-chambers. The shaft B' is the driving-shaft of the engine, and the shaft C' is an idler-shaft. The shafts B' and C' are connected by suitable gear H. The gear H are of the same size, so that the shafts are driven at the same rate of speed.

Mounted on the shaft B' is a cylindrical piston B, which is somewhat less in diameter than the chamber *a*. (See Figs. 1 and 2.) The piston B is of such length that its ends revolve in contact with the piston-heads A'. (See Figs. 1, 4, and 5.) The piston B is provided with a radially-projecting fin or rib-like piston-head *b*, which extends the full length of the piston.

An idler C, which is of the same diameter as the piston B, is mounted on the shaft C' in the auxiliary chamber *a'*. The idler C is a comparatively close fit in the chamber A' and projects into the cylinder-chamber *a* and contacts with the periphery of the piston B. The idler C is provided with a longitudinal groove *c*, adapted to receive the piston-head *b* as the piston and idler are revolved together. Steam-inlet ports D are provided at each side of the cylinder. (See Figs. 2 and 3.) The inlet-ports

D open into the cylinder at points within the periphery of the piston B. These ports are connected to a suitable steam-supply by the pipes D' and D". (See Fig. 1.) Steam-passages *d*, adapted to be brought into register with the inlet-ports as the piston is revolved, are formed in the ends of the piston. (See Figs. 2 and 5.) These piston steam-passages *d* are formed in the arc of a circle, so that they extend, preferably, about two-thirds of the way about the piston. The passages *d* open into the piston-chamber at the rear of the piston-head *b*, as clearly appears in Fig. 2. I desire, however, to here remark that the length of these piston steam-passages may be varied very greatly and desirable results still be secured. As the length of these passages controls the period of admission of steam to the cylinder during each stroke, their length may be so proportioned as to utilize the maximum of the expansive force of the steam, thus utilizing the maximum of power.

The cylinder is provided with exhaust-ports E at each side. These ports open into the piston-chamber *a* below the point of contact of the idler C with the piston. The ports E thus arranged provide a free exhaust for the cylinder, so that the portion of the cylinder in front of the piston, whatever its position may be, is always fully open to the exhaust, thereby avoiding any back pressure in operation. A further advantage is that the cylinder is wiped practically free of all exhaust at each stroke.

I have illustrated and described the inlet and steam-exhaust passages as being duplicated on each side of the cylinder. I desire to remark, however, that the structure is satisfactory without this duplication. However, when thus duplicated the piston is balanced and friction is thereby greatly reduced.

The inner faces of the cylinder-heads A' are beveled away about the shafts B' to receive the V-shaped packing-rings *e*. (See Fig. 1.) These packing-rings, although comparatively small, when thus arranged are entirely effective.

To equalize the pressure on the idler C, I provide a small groove-like steam-passage *a''* in the inner wall of the chamber *a*. (See Figs. 2 and 7.) This groove or passage *a''* opens at one end into the upper part of the chamber *a* and extends nearly around the idler C, so that to a large extent the pressure on the idler is equalized, thereby reducing the friction to a minimum.

By this arrangement of parts I am enabled to secure a very compact structure and one which is readily assembled or disassembled.

My improved rotary engine is adapted to run at a very high rate of speed and utilizes a maximum amount of the power used, as both the impact and expansive force of the steam is utilized. This result is further ad-

vanced by the reduction of the friction of the parts which, as I have stated, is reduced to a minimum.

By dispensing with valves I am enabled to reduce the cost of production and also produce a structure which is more durable and less likely to get out of repair.

My improved engine is particularly desirable for use in light engines on account of its utilization of a maximum of the power supplied thereto and its even and comparatively noiseless operation, which is of course very desirable for use in motor vehicles, launches, and the like.

I have illustrated and described my improved rotary engine in detail in the form preferred by me on account of its structural simplicity and the economy of the production of the parts. I am, however, aware that it is capable of very great structural variation without departing from my invention.

While I have illustrated and described my invention adapted to steam, I desire to remark that it is applicable to explosive-engines, and I desire to claim the same specifically as well as broadly.

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

1. In a rotary engine, the combination of a cylinder, having a piston and an auxiliary chamber therein; cylinder-heads having bearings thereon, detachably secured to said cylinder; a driving-shaft and an auxiliary shaft; gear connections for said shafts; grooves in the inner faces of said cylinder-heads about said shafts; suitable packing-rings in said grooves; a cylindrical piston having a radially-projecting rib-like piston-head thereon, mounted on said driving-shaft; a cylindrical idler adapted to contact with said piston having a longitudinal peripheral groove therein adapted to receive said piston-head, mounted on said idler-shaft; inlet-ports opening into said piston-chamber within the periphery of said piston; circular steam-passages in the ends of said piston, opening into said cylinder to the rear of said piston-head, adapted to come into register with said inlet-ports as said piston is revolved; exhaust-ports opening into said cylinder just below the point of contact of said piston and said idler; and a groove-like steam-passage in the wall of said auxiliary chamber, for the purpose specified.

2. In a rotary engine, the combination of a cylinder, having a piston and an auxiliary chamber therein; cylinder-heads having bearings thereon, detachably secured to said cylinder; a driving-shaft and an auxiliary shaft; gear connections for said shafts; a cylindrical piston having a radially-projecting rib-like piston-head thereon, mounted on said driving-shaft; a cylindrical idler adapted to contact with said piston having a longitudinal periph-

eral groove therein adapted to receive said piston-head, mounted on said idler-shaft; inlet-ports opening into said piston-chamber within the periphery of said piston; circular steam-passages in the ends of said piston, opening into said cylinder to the rear of said piston-head, adapted to come into register with said inlet-ports as said piston is revolved; exhaust-ports opening into said cylinder just below the point of contact of said piston and said idler; and a groove-like steam-passage in the wall of said auxiliary chamber, for the purpose specified.

3. In a rotary engine, the combination of a cylinder, having a piston and an auxiliary chamber therein; cylinder-heads having bearings thereon, detachably secured to said cylinder; a driving-shaft and an auxiliary shaft; gear connections for said shafts; grooves in the inner faces of said cylinder-heads about said shafts; suitable packing-rings in said grooves; a cylindrical piston having a radially-projecting rib-like piston-head thereon, mounted on said driving-shaft; a cylindrical idler adapted to contact with said piston having a longitudinal groove therein adapted to receive said piston-head, mounted on said idler-shaft; inlet-ports opening into said piston-chamber within the periphery of said piston; circular steam-passages in the ends of said piston, opening into said cylinder to the rear of said piston-head, adapted to come into register with said inlet-ports as said piston is revolved; and exhaust-ports opening into said cylinder just below the point of contact of said piston and said idler.

4. In a rotary engine, the combination of a cylinder, having a piston and an auxiliary chamber therein; cylinder-heads having bearings thereon, detachably secured to said cylinder; a driving-shaft and an auxiliary shaft; gear connections for said shafts; a cylindrical piston having a radially-projecting rib-like piston-head thereon, mounted on said driving-shaft; a cylindrical idler adapted to contact with said piston having a longitudinal peripheral groove therein adapted to receive said piston-head, mounted on said idler-shaft; inlet-ports opening into said piston-chamber within the periphery of said piston; circular steam-passages in the ends of said piston, opening into said cylinder to the rear of said piston-head, adapted to come into register with said inlet-ports as said piston is revolved; and exhaust-ports opening into said cylinder just below the point of contact of said piston and said idler.

5. In a rotary engine, the combination of a cylinder having a piston and an auxiliary chamber therein; a driving-shaft and an auxiliary shaft; gear connections for said shafts; a cylindrical piston, having a radially-projecting rib-like piston-head thereon, mounted on said driving-shaft; a cylindrical idler adapt-

ed to contact with said piston, having a longitudinal peripheral groove adapted to receive said piston-head, mounted on said idler-shaft; inlet-ports opening into said piston-chamber to the rear of said piston; circular steam-passages in the ends of said piston, opening into said cylinder within the periphery of said piston-head, adapted to come into register with said inlet-ports as said piston is revolved; exhaust-ports opening into said cylinder just below the point of contact of said piston and said idler; and a groove-like steam-passage in the wall of said auxiliary chamber, for the purpose specified.

6. In a rotary engine, the combination of a cylinder having a piston and an auxiliary chamber therein; a driving-shaft and an auxiliary shaft; gear connections for said shafts; a cylindrical piston, having a radially-projecting rib-like piston-head thereon, mounted on said driving-shaft; a cylindrical idler adapted to contact with said piston, having a longitudinal peripheral groove adapted to receive said piston-head, mounted on said idler-shaft; inlet-ports opening into said piston-chamber within the periphery of said piston; circular steam-passages in the ends of said piston, opening into said cylinder to the rear of said piston-head, adapted to come into register with said inlet-ports as said piston is revolved; and exhaust-ports opening into said cylinder just below the point of contact of said piston and said idler, for the purpose specified.

7. In a rotary engine, the combination of a cylinder, having a piston and an auxiliary chamber therein; a driving-shaft and an auxiliary shaft; gear connections for said shafts; a cylindrical piston having a radially-projecting rib-like piston-head thereon, mounted on said driving-shaft; a cylindrical idler adapted to contact with said piston having a longitudinal peripheral groove adapted to receive said piston-head, mounted on said idler-shaft; an inlet-port opening into said piston-chamber within the periphery of said piston; a circular steam-passage in the end of said piston, opening into said cylinder to the rear of said piston-head, adapted to come into register with said inlet-port as said piston is revolved; an exhaust-port opening into said cylinder just below the point of contact of said piston and said idler, for the purpose specified.

8. In a rotary engine, the combination of a cylinder, having a piston and an auxiliary chamber therein; a driving-shaft and an auxiliary shaft; gear connections for said shafts; a cylindrical piston having a radially-projecting rib-like piston-head thereon, mounted on said driving-shaft; a cylindrical idler adapted to contact with said piston having a longitudinal peripheral groove adapted to receive said piston-head, mounted on said idler-shaft; an inlet-port opening into said piston-chamber within the periphery of said piston; a cir-

cular steam-passage in the end of said piston,
opening into said cylinder to the rear of said
piston-head, adapted to come into register
with said inlet-port, as said piston is revolved;
5 a suitable exhaust-port; and a groove-like
steam-passage in the wall of said auxiliary
chamber, for the purpose specified.

In witness whereof I have hereunto set my
hand and seal in the presence of two witnesses.

JOHN H. PUTNAM. [L. s.]

Witnesses:

H. J. BONEBRIGHT,
C. M. DEWEY.