No. 740,944. PATENTED OCT. 6, 1903.

L. VAN D. SUTTON.

ROTARY ENGINE.

APPLICATION FILED FEB. 24, 1903.

NO MODEL. 6 SHEETS—SHEET 1.

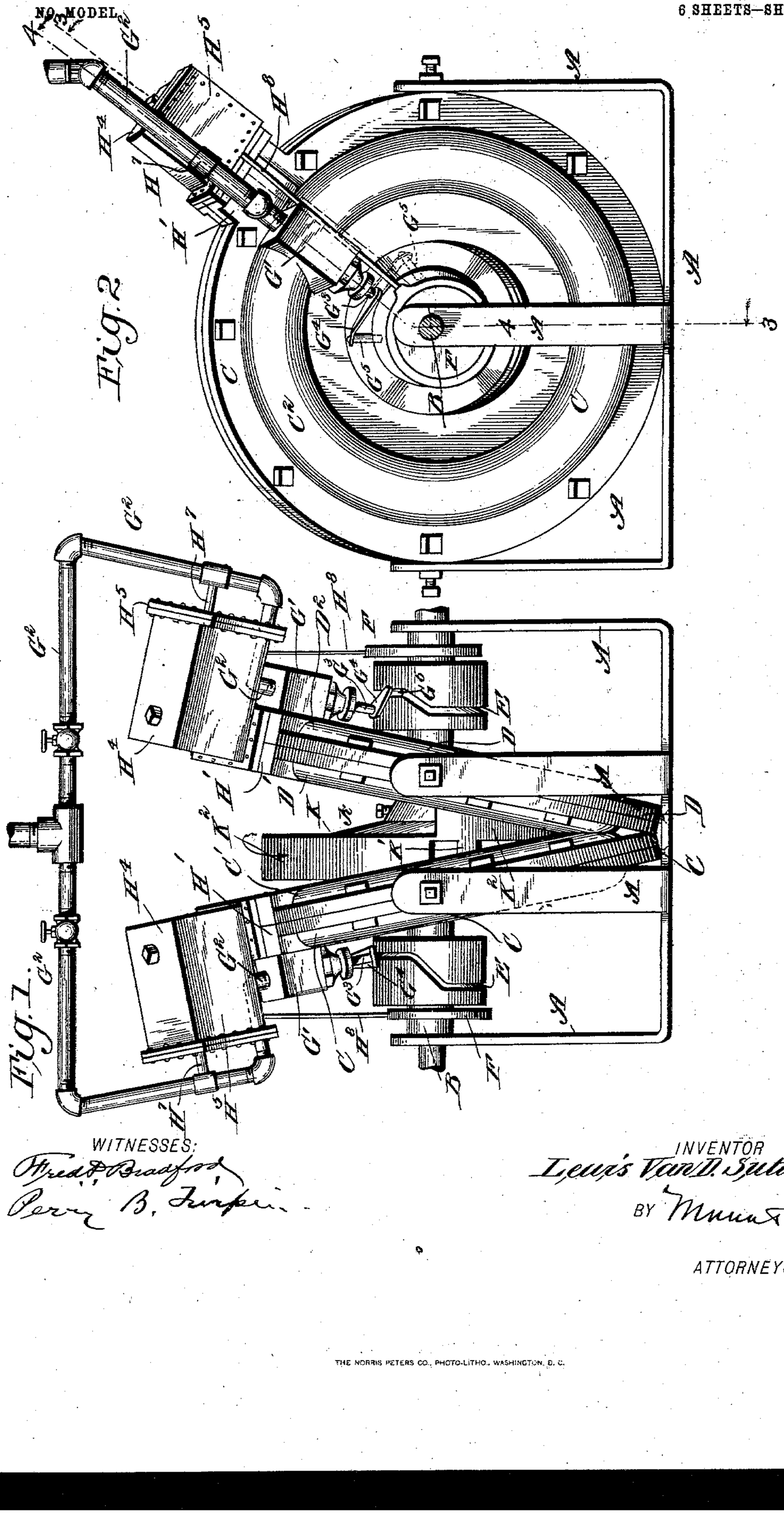

Fig. 2.

Fig. 1.

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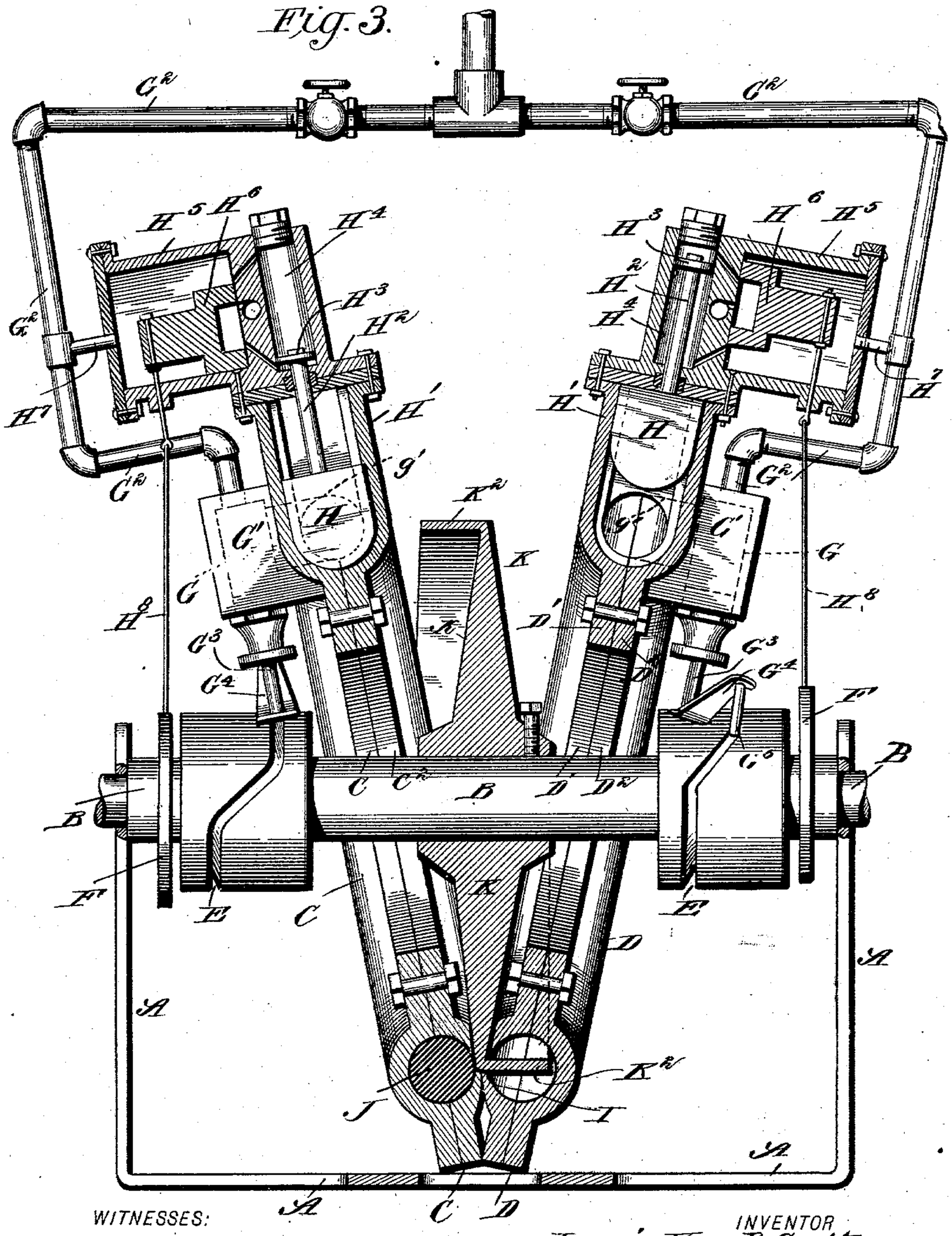
NO MODEL. 6 SHEETS—SHEET 2.

Fig. 3.



WITNESSES:

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NO MODEL. 6 SHEETS—SHEET 3.

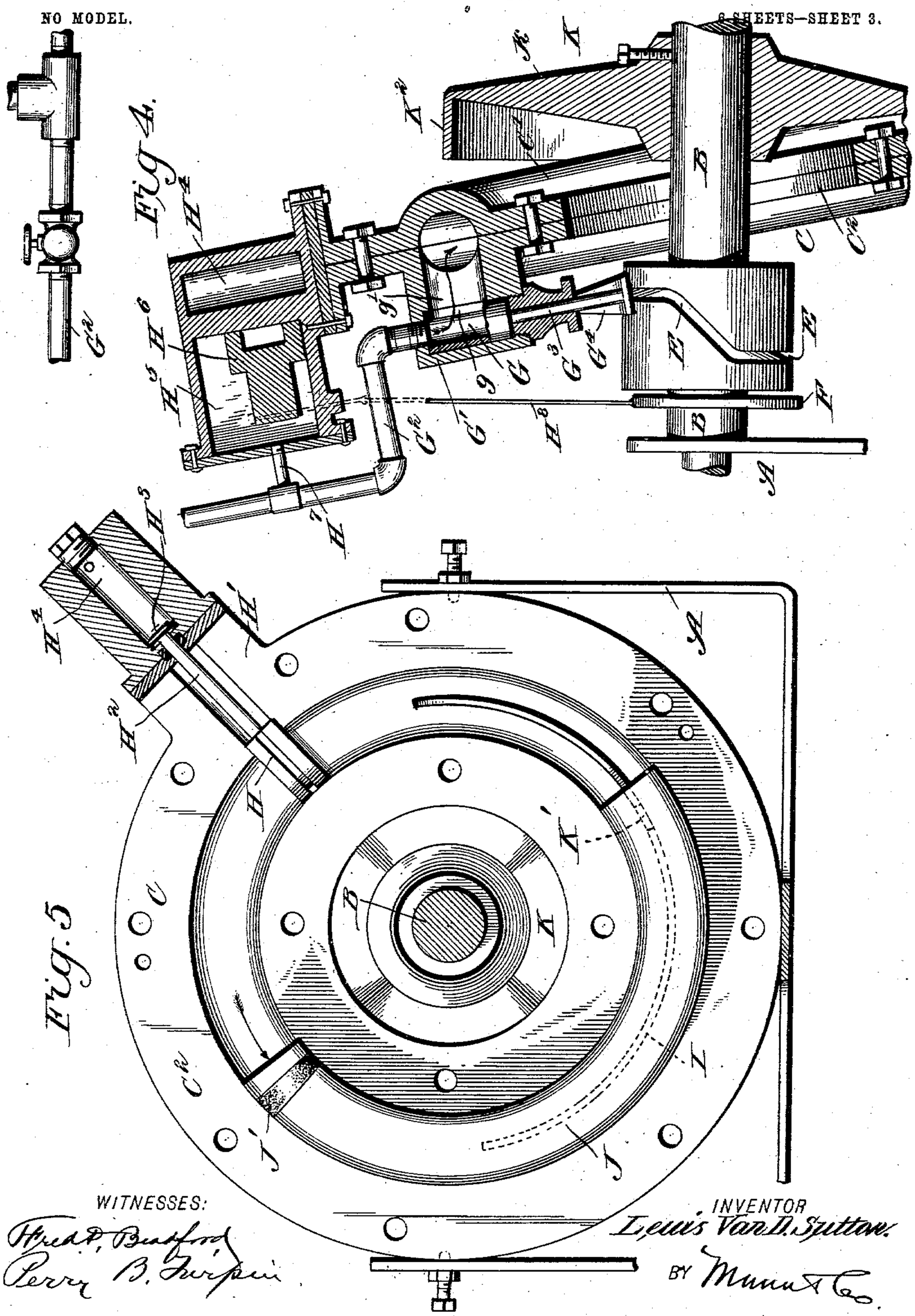

Fig. 4.

Fig. 5.

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NO MODEL. 6 SHEETS—SHEET 4.

Fig. 7.

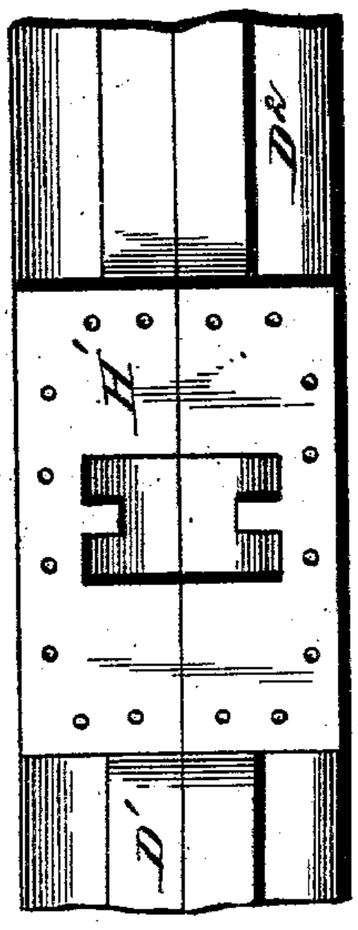


Fig. 8.

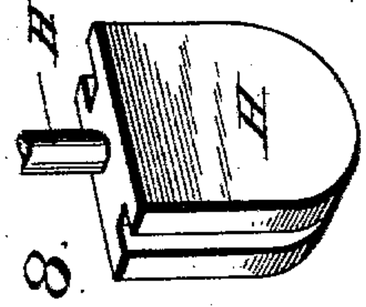


Fig. 9.

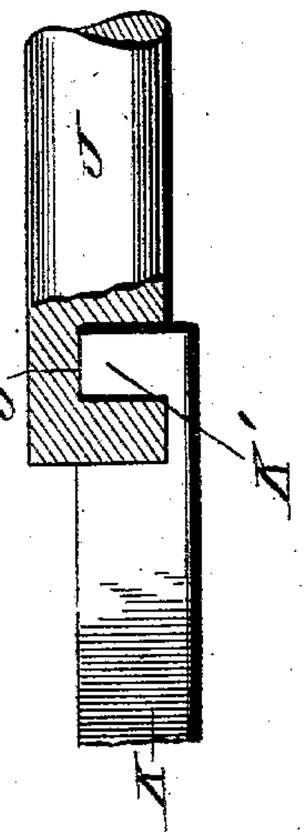
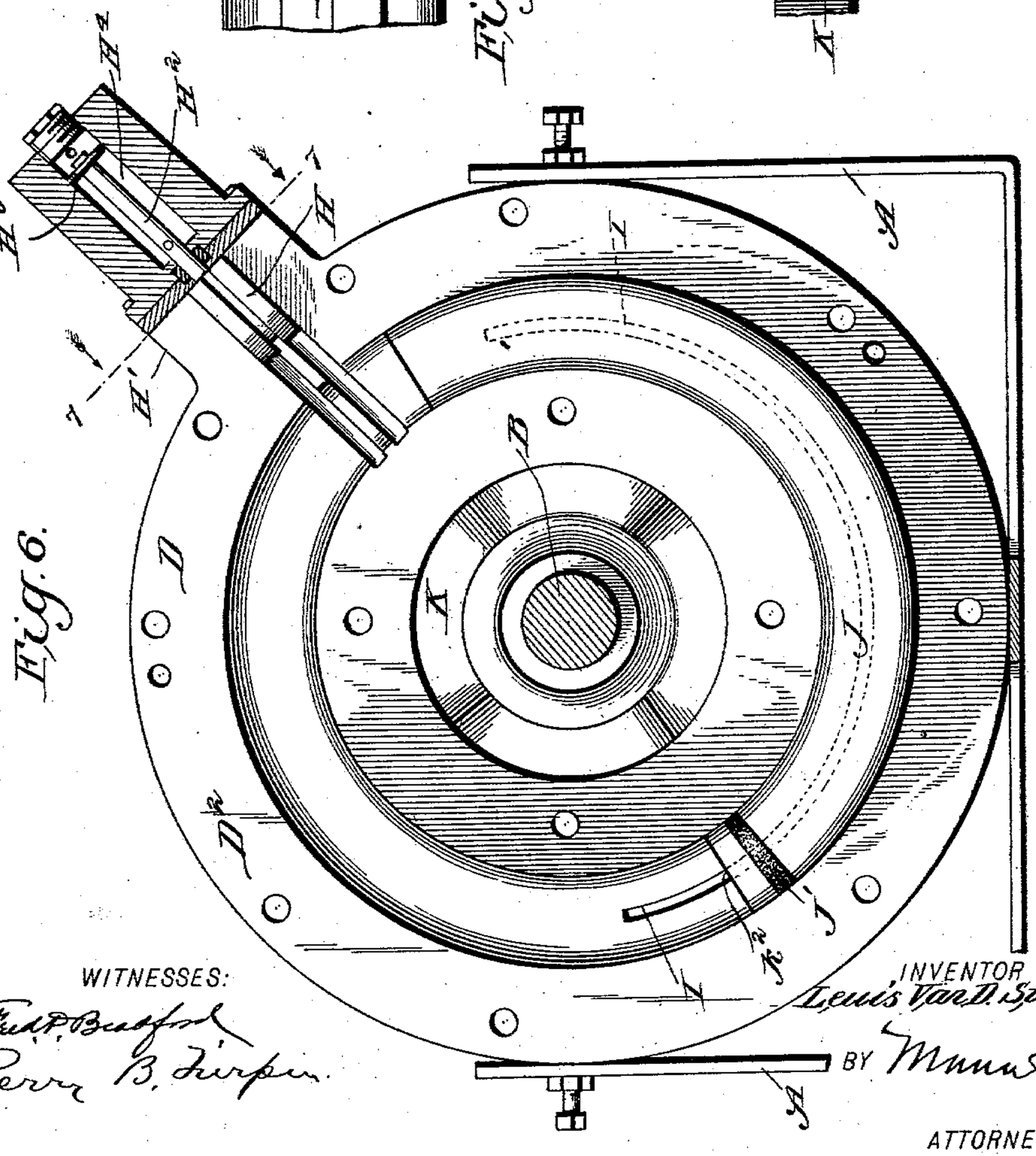


Fig. 6.



WITNESSES:

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APPLICATION FILED FEB. 24, 1903.

NO MODEL. 6 SHEETS—SHEET 5.

Fig. 12

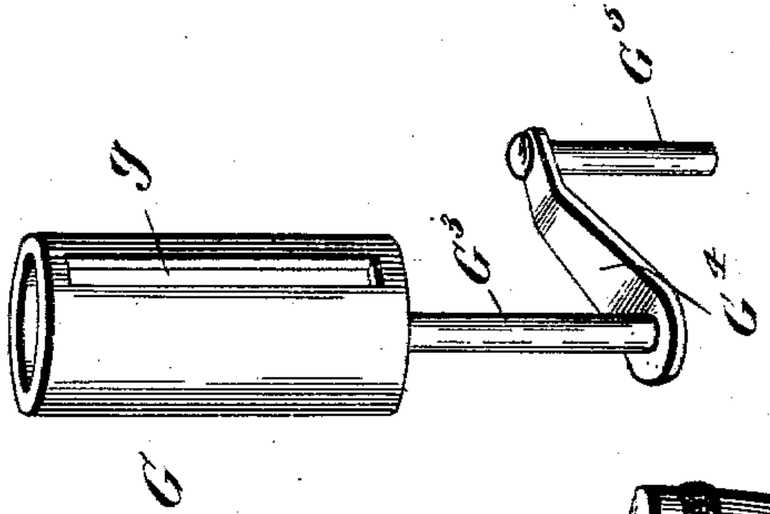


Fig. 11.

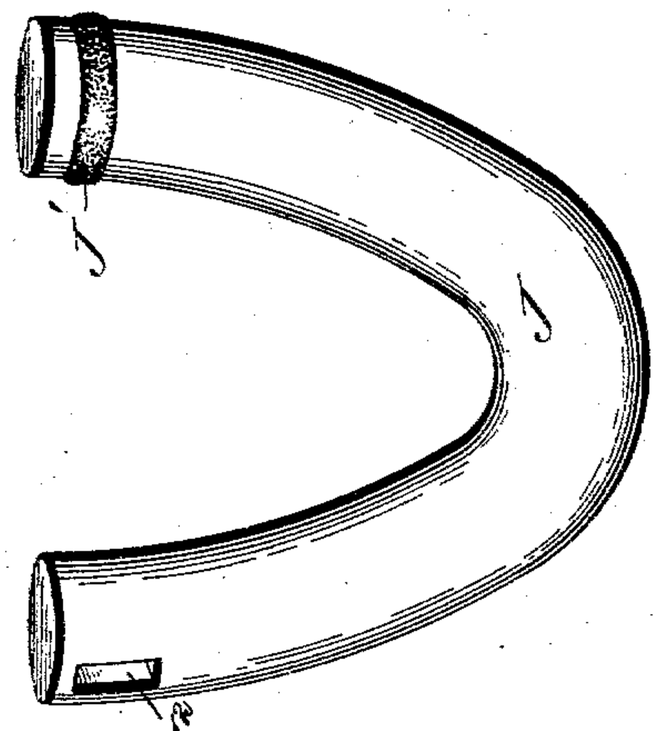
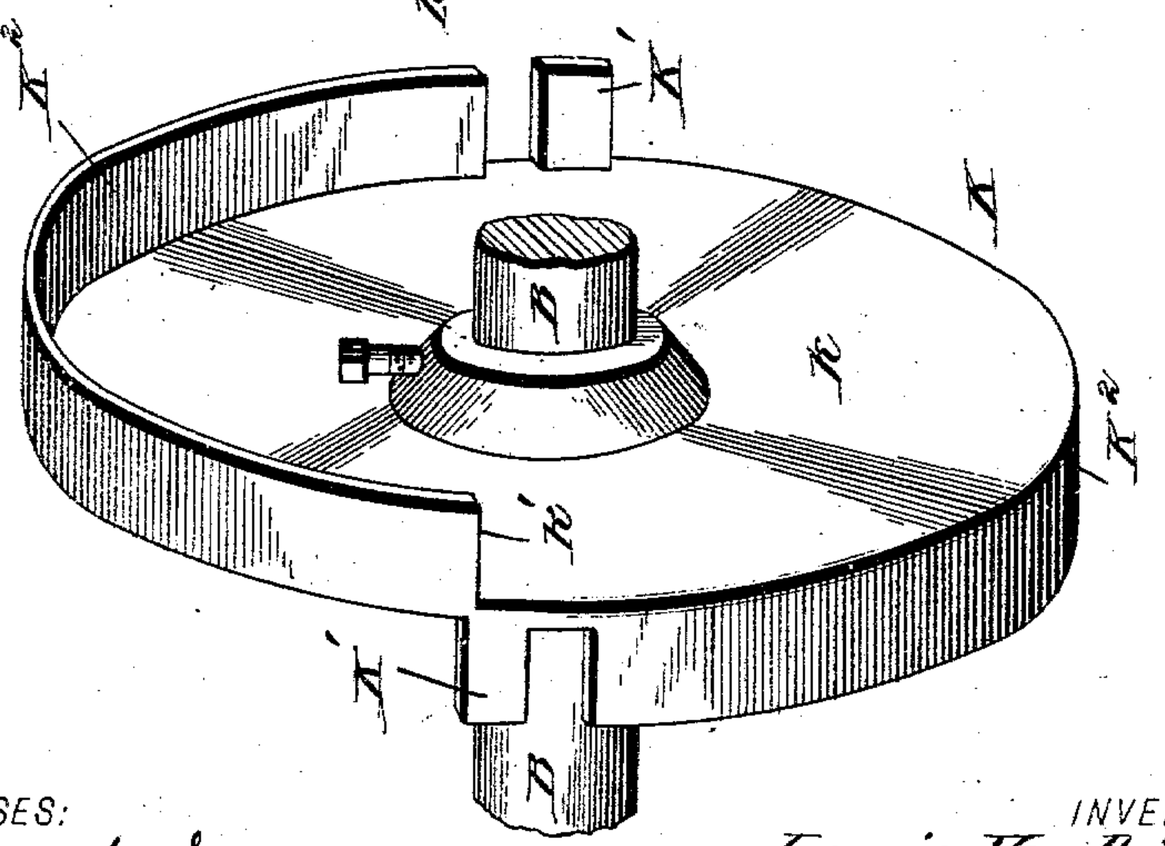


Fig. 10.



WITNESSES:

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No. 740,944. PATENTED OCT. 6, 1903.

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ROTARY ENGINE.

APPLICATION FILED FEB. 24, 1903.

NO MODEL. 6 SHEETS—SHEET 6.

Fig. 14.

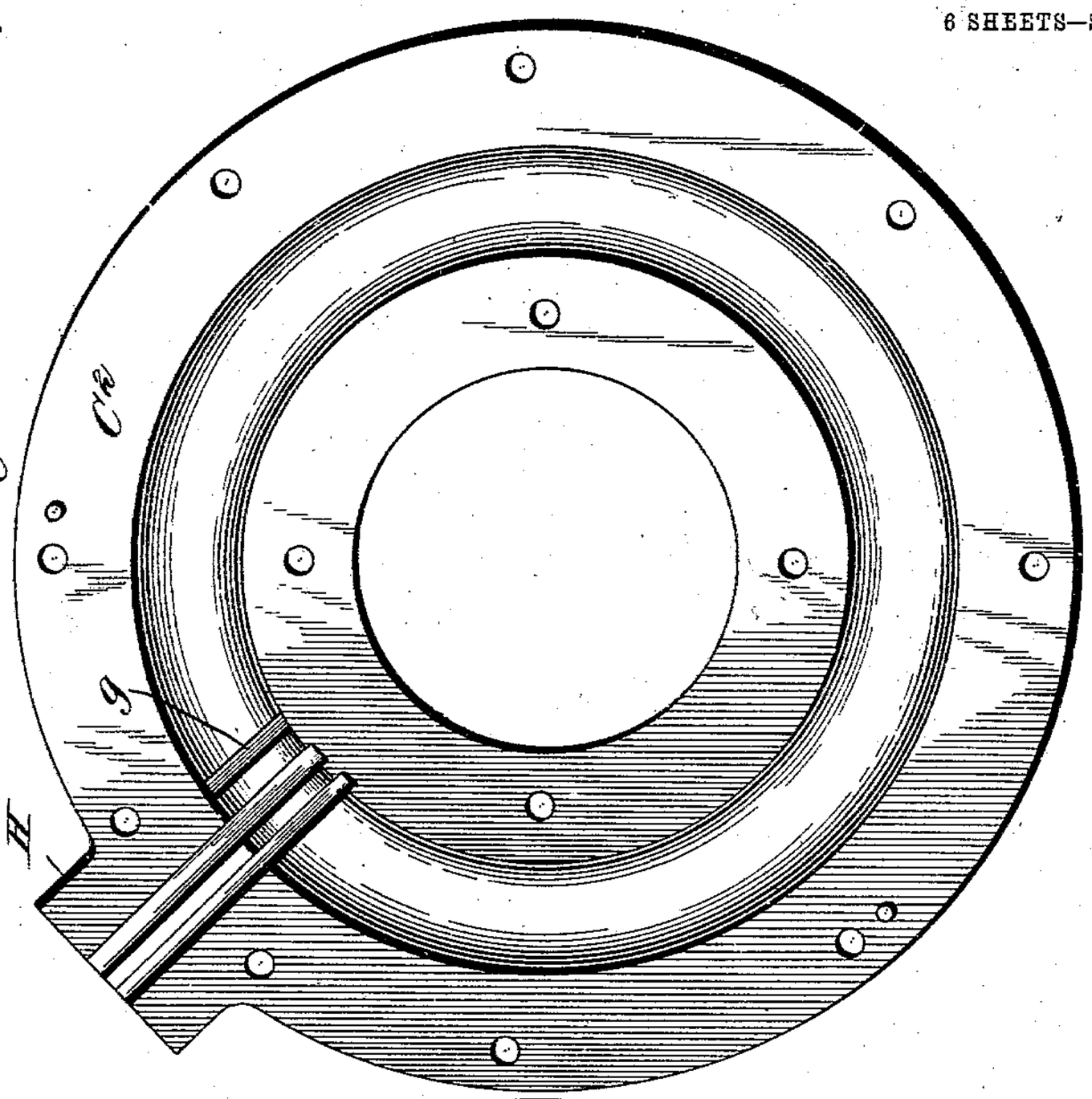
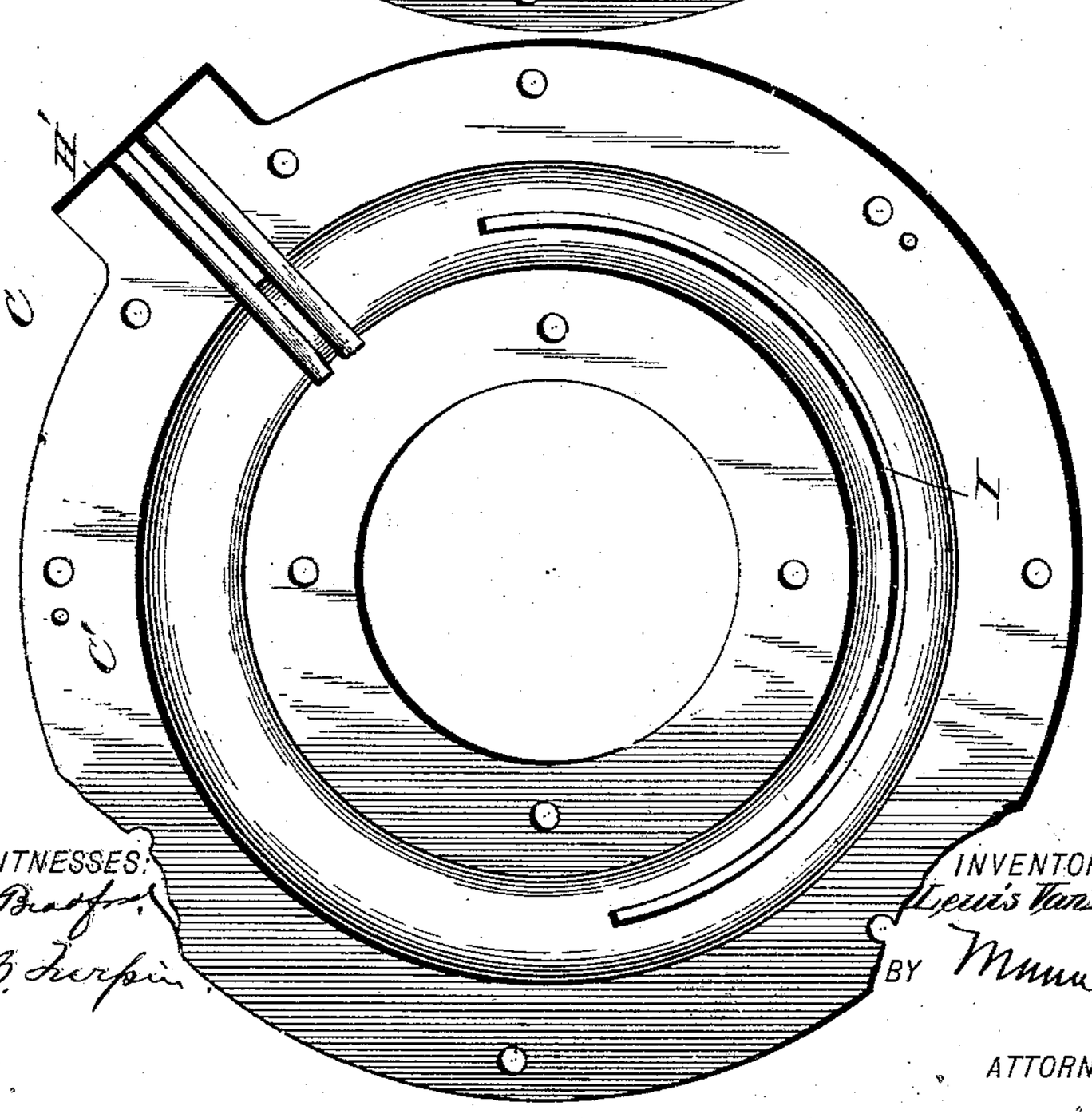


Fig. 13.



WITNESSES:

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No. 740,944. Patented October 6, 1903.

UNITED STATES PATENT OFFICE.

LEWIS VAN D. SUTTON, OF WEST NEWTON, PENNSYLVANIA.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 740,944, dated October 6, 1903.

Application filed February 24, 1903. Serial No. 144,565. (No model.)

To all whom it may concern:

Be it known that I, LEWIS VAN D. SUTTON, a citizen of the United States, residing at West Newton, in the county of Westmoreland and State of Pennsylvania, have made certain new and useful Improvements in Rotary Engines, of which the following is a specification.

My invention is an improvement in rotary engines; and it consists in certain novel constructions and combinations of parts, as will be hereinafter described and claimed.

In the drawings, Figure 1 is a side elevation, and Fig. 2 an end elevation, of an engine embodying my invention. Fig. 3 is a vertical section on about line 3 3 of Fig. 2. Fig. 4 is a partial section on about line 4 4 of Fig. 2. Fig. 5 is a side elevation of the inner face of the inner section of one of the cylinders. Fig. 6 is a side elevation of the inner face of one of the inner cylinder-sections, showing the piston in a different position from that shown in Fig. 5. Fig. 7 is a detail plan view on about the line 7 7 of Fig. 6. Fig. 8 is a detail perspective view of the abutment-head. Fig. 9 is a detail view, partly in section, showing connection between one of the pistons and the carrier. Fig. 10 is detail perspective view of the carrier. Fig. 11 is a detail perspective view of one of the pistons. Fig. 12 is a detail perspective view of one of the feed-valves. Fig. 13 is detail elevation of the inner face of the inner section of one of the cylinders, and Fig. 14 is a detail elevation of the inner face of the outer section of one of the cylinders.

In carrying out my invention I employ a suitable frame A, in which is supported in bearings the shaft B, which is the main shaft of the engine. This frame A also supports the cylinders C and D, which may be alike, except that they are rights and lefts and are supported in the frame so that they stand at an inclined angle to each other and at an inclined angle with respect to the shaft. In the construction shown the cylinders are arranged close together at their lower ends and diverge toward their upper ends, so that they afford space between them for the operation of the carrier, presently described. The shaft is provided with cam-grooves E for operating the rocking feed-valves and with eccentrics F for operating the abutment-heads, as will be more fully described hereinafter. The cylinders are shown as annular tubes consisting of two sections—an inner section C′ or D′ and an outer section C^2 or D^2—the sections being fitted together at their inner faces and bolted or otherwise secured, so as to present a circular cylinder for the operation of the steam and of the piston, as desired. Each cylinder is provided with a casing G′ for the feed-valve G and with a port g', leading from such valve into the casing at one side of the abutment H, as best shown in Fig. 14 of the drawings.

As the construction of the feed-valves and of the abutments and of the devices for operating the same are alike in connection with both cylinders, except that they are operated with certain relation to each other, the description of one will answer for both.

The abutment H operates in suitable guides within a casing H′ and has a rod H^2, provided with a piston H^3, operating in a cylinder H^4, having a steam-chest H^5, provided with a slide-valve H^6 of suitable construction for controlling the admission of steam to the opposite ends of the cylinder H^4 and the proper exhaust of such steam in the operation of the engine. The steam is supplied to the chest H^5 through a pipe H^7, and the valve H^6 is operated by a rod H^8 from an eccentric F^8 on the shaft B. By this construction, the eccentric being properly set, steam will be admitted to move the abutment across its cylinder after the piston, presently described, has passed the abutment, so that steam supplied by the feed-valve will operate between said abutment H and the rear end of the piston to drive the same forward, as desired.

The feed-valve G is shown as a rocking valve rocking within a casing G′, to which steam is supplied by a pipe G^2, and having a port g, which may be turned into and out of register with the feed-port g', leading to its cylinder. This valve G has a shaft G^3, provided with a crank-arm G^4, having a pin G^5 entering the cam-groove E on the shaft B. It should be understood that the cam-grooves should be arranged as shown, so that the valves will operate alternately—that is to say, one valve will be feeding steam to its cylinder when the other valve is cut out.

This may be effected by the arrangement of the cam-grooves as shown in Fig. 3 of the drawings.

In the inner sections of the cylinders I provide slots I, through which project webs or flanges on the carrier, presently described. The purpose of this carrier is to receive motion from the pistons as the latter are driven by the action of the steam and to carry the pistons after the steam has exhausted around to the point where they can receive the steam, and by arranging the same to act alternately in the two cylinders I am able to secure a practically continuous operation of the shaft through the carrier, as will be understood from the following description. The pistons J are in the form of long curved cylindrical bodies which are packed at J′ near their rear ends and are provided near their opposite or forward ends with openings or recesses J^2 for engagement by the lugs or projections K′ on the carrier K. This carrier K is secured upon the shaft B and is arranged and operates between the opposite cylinders C and D and is provided on its opposite sides with the projecting webs or flanges K^2, which extend circumferentially around the circular carrier K for a portion of its circumference and project laterally from the body *k* of said carrier, so they may enter the slots I and operate within the cylinders C and D throughout a portion of the length of the said cylinders, the slots I extending only for a portion of the length of the cylinders and the arrangement of the cylinders in a plane at an angle to that of the carrier permitting such operation, as will be understood from the drawings. The webs K^2 are arranged at one end, k^2, to operate in rear of the pistons J in order to force said pistons around toward the position where they will be operated upon by the steam admitted from the feed-valve, the lugs or projections K′ being arranged at the opposite ends of the webs K^2, so they may enter the recess J^2 in the front ends of the pistons J, so the pistons J will operate the carrier while the said piston is being positively operated by the admitted steam. It will thus be noticed that when the steam is admitted to operate upon the pistons J, the parts being in the position shown in Fig. 1, the lugs K on the carrier will be engaged in the recess J^2 of the piston, so the said piston will positively operate the carrier until the steam-pressure is relieved from the piston J, after which the end of the web K^2 opposite the lug K′ will engage in rear of the piston J′ and will operate such piston around toward the point where it takes steam, the abutment-head being properly operated by means of the eccentric, as before described.

From the foregoing description, in connection with the accompanying drawings, it will be noticed that when the piston is in position shown in Fig. 5 steam will be in the space between said piston and the abutment-head H and will operate the piston in the direction indicated by the arrow in Fig. 5 until such steam exhausts. As the piston is operated by the pressure of the steam it carries with it the intermediate carrier by the engagement between the front end of said piston and the carrier, effected in the construction shown by means of the lug K′ entering the recess J, as will be understood from Figs. 9, 10, and 11. After the piston has passed the point where it is operated upon by the steam the rear end *k*′ of the blade K^2 will adjust in rear of the piston and will operate to carry the piston around toward its position to take steam, the carrier being operated during this latter movement by its positive connection with the piston of the other cylinder, as will be understood from Fig. 3 of the drawings.

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

1. The rotary engine herein described, comprising the main shaft, the carrier secured thereon and provided at its opposite sides with the laterally-projecting webs or flanges provided at one end with lugs or projections to enter recesses in the pistons and arranged at their opposite ends to operate in rear of the pistons, the cylinder encircling the shaft on opposite sides of the carrier and arranged at an inclination inclining outwardly from their lower toward their upper ends, and provided at their inner sides with slots extending circumferentially for a portion of the circumference of the cylinders, the pistons operating within the cylinders and provided near their front ends with recesses for the lugs or projections of the carrier, the webs of the carrier being arranged to operate within the slots of the cylinders, the abutment-heads, cylinders for said pistons, and means for controlling the admission of steam to said cylinders, devices for operating said controlling means from the shaft, the rocking feed-valves for controlling passage of steam to the main cylinders, and cam devices on the main shaft for operating the rocking feed-valves, substantially as set forth.

2. The rotary engine herein described, comprising the cylinders consisting of annular tubes, the shaft passing through the said tubes, the pistons operating in the cylinders and consisting of long curved cylindrical bodies, means for controlling the admission of steam to the cylinders, the abutments operating in the cylinders, means for operating the abutments, and the carrier arranged between the cylinders and provided with means for engagement with the cylindrical pistons of the opposite cylinders, substantially as set forth.

3. A rotary engine comprising the opposite cylinders, the pistons operating in the opposite cylinders, the shaft passing through the opposite cylinders, and the carrier on the shaft between the cylinders and provided with means for engagement with the pistons

in the opposite cylinders, substantially as set forth.

4. The combination of the opposite cylinders in the form of annular tubes, and provided in their inner adjacent sides with circumferentially-extending slots, the pistons operating in said cylinders, and the carrier operating between the cylinders and provided with laterally-projecting portions extending through the slots in the cylinders and engaging with the pistons therein, substantially as set forth.

5. A rotary engine comprising the cylinders in the form of annular tubes, and arranged in planes at an angle to each other, the pistons in said cylinders, the shaft extending through said cylinders, and the carrier secured on the shaft and provided with means for engagement with the pistons of the opposite cylinders, substantially as set forth.

6. The combination in a rotary engine, of the opposite cylinders in the form of annular tubes provided in their inner adjacent sides with circumferentially-extending slots, said cylinders being arranged in planes at angles to each other, the pistons in said cylinders, the shaft extending through the cylinders, the carrier arranged between the cylinders and provided with laterally-projecting portions extending through the slots in the cylinders and engaging with the pistons therein, the abutment-heads in the cylinders, and means for operating such abutment-heads from the shaft, the feed-valves, and means for operating the feed-valves from the shaft, substantially as set forth.

7. The combination in a rotary engine, of the opposite cylinders in the form of annular tubes, the pistons operating in the cylinders, means for controlling the admission of steam to operate the pistons, the shaft and devices connected with the shaft and arranged intermediate the opposite pistons for an engagement therewith, whereby the pistons may when operated by the steam operate the intermediate means and the latter may operate the pistons when the steam is exhausted from the cylinders of said pistons, substantially as set forth.

8. A rotary engine comprising a shaft, a carrier on the shaft and provided with laterally-projecting webs or flanges, and cylinders on opposite sides of said carrier and provided with pistons engaged by the laterally-projecting webs of the carrier, substantially as set forth.

9. A rotary engine having a cylinder in the form of an annular tube provided in its side with a circumferentially-extending slot, a piston operating in said cylinder and arranged to move continuously in one direction, the carrier operating alongside the cylinder, and means projecting from the carrier through the slot in the cylinder for engagement with said piston whereby the piston may operate said carrier during a portion of its stroke and may be operated by the carrier during another portion of its stroke, substantially as set forth.

10. The combination of the opposite cylinders, the pistons therein, and a carrier between the cylinders and having means for engagement with the pistons of the opposite cylinders, whereby the carriers may be alternately operated by the pistons and may operate said pistons consecutively, substantially as set forth.

11. In a rotary engine, a cylinder in the form of an annular tube having at one side a circumferentially-extending slot opening into the cylinder, the piston operating in the cylinder, and devices extending through said slot and engaging with the piston, substantially as set forth.

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