No. 709,961. Patented Sept. 30, 1902.

T. J. BUSH.

ROTARY ENGINE.

(Application filed Mar. 24, 1902.)

(No Model.) 3 Sheets—Sheet 1.

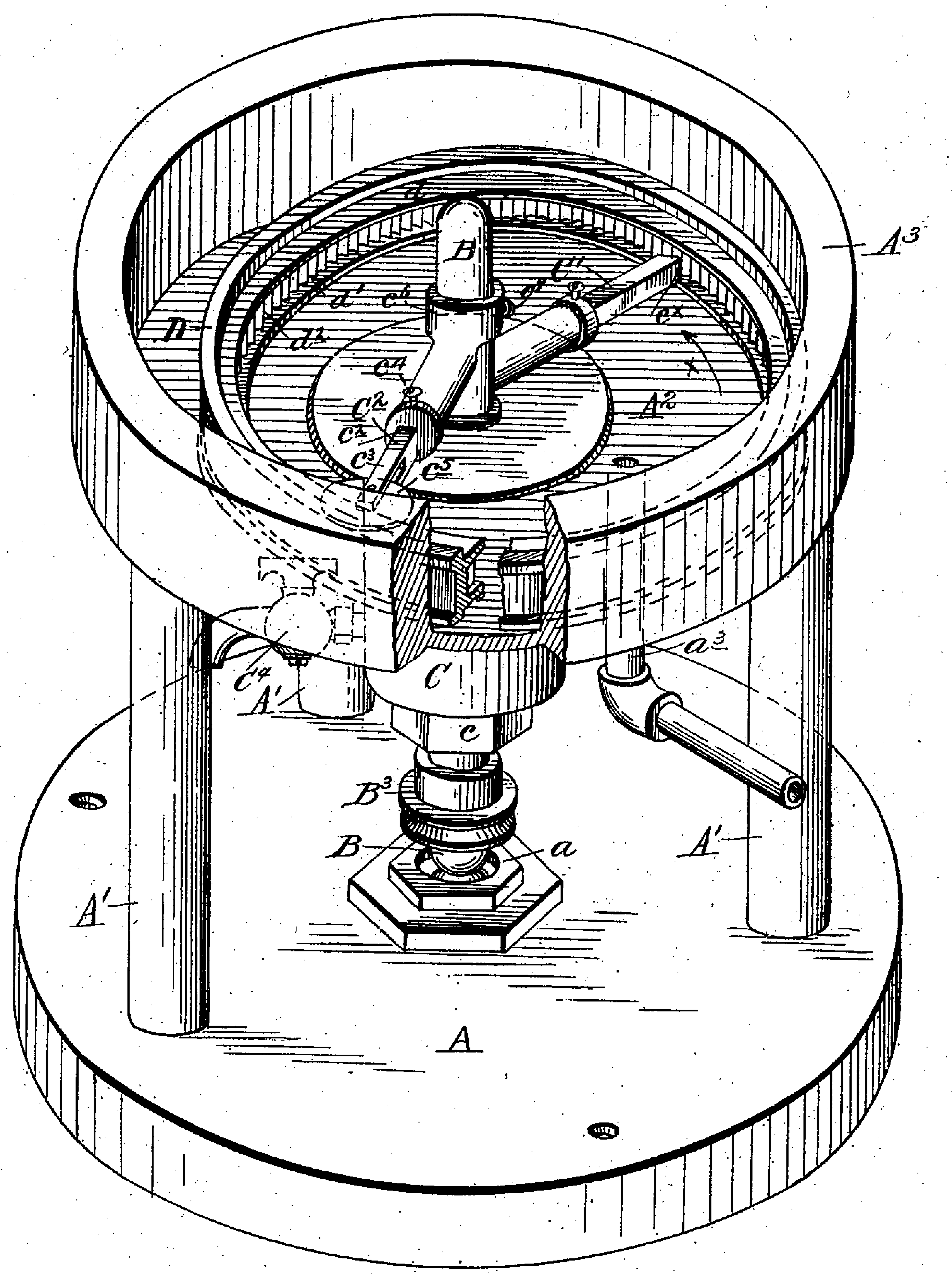

Fig. 1.

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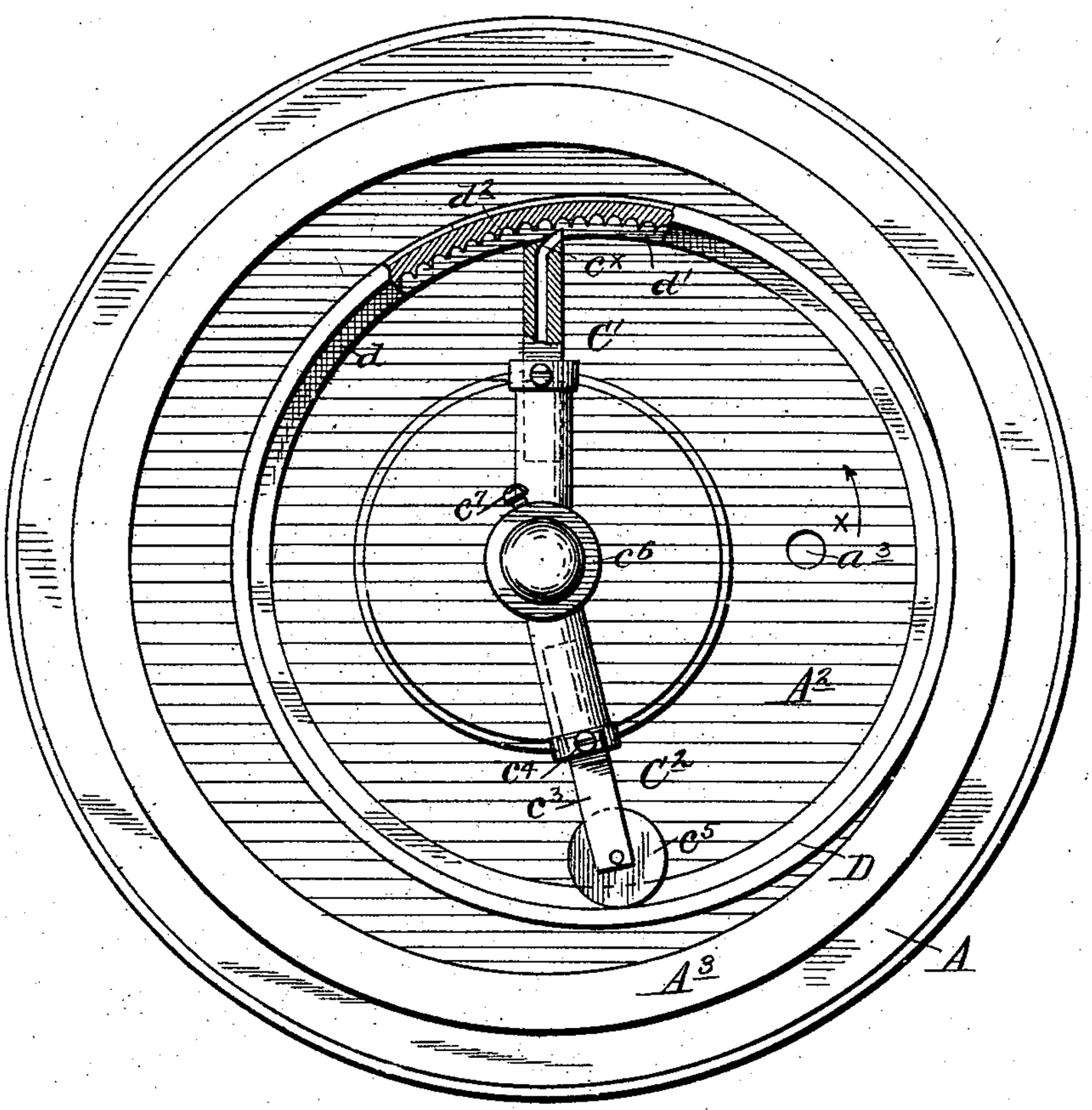

Fig. 2.

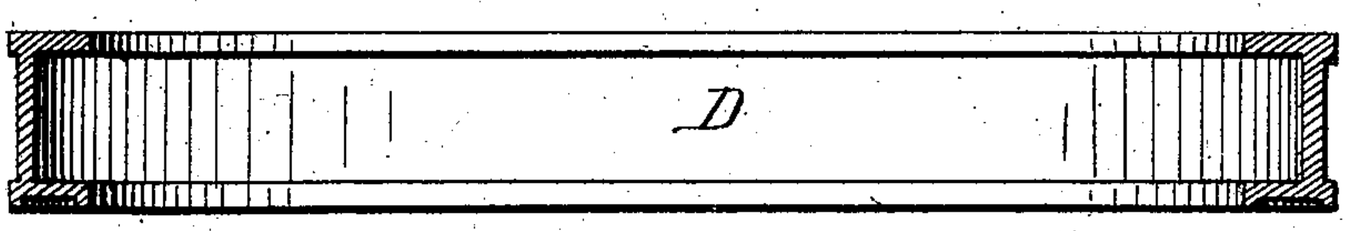

Fig. 4.

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(No Model.) 3 Sheets—Sheet 3.

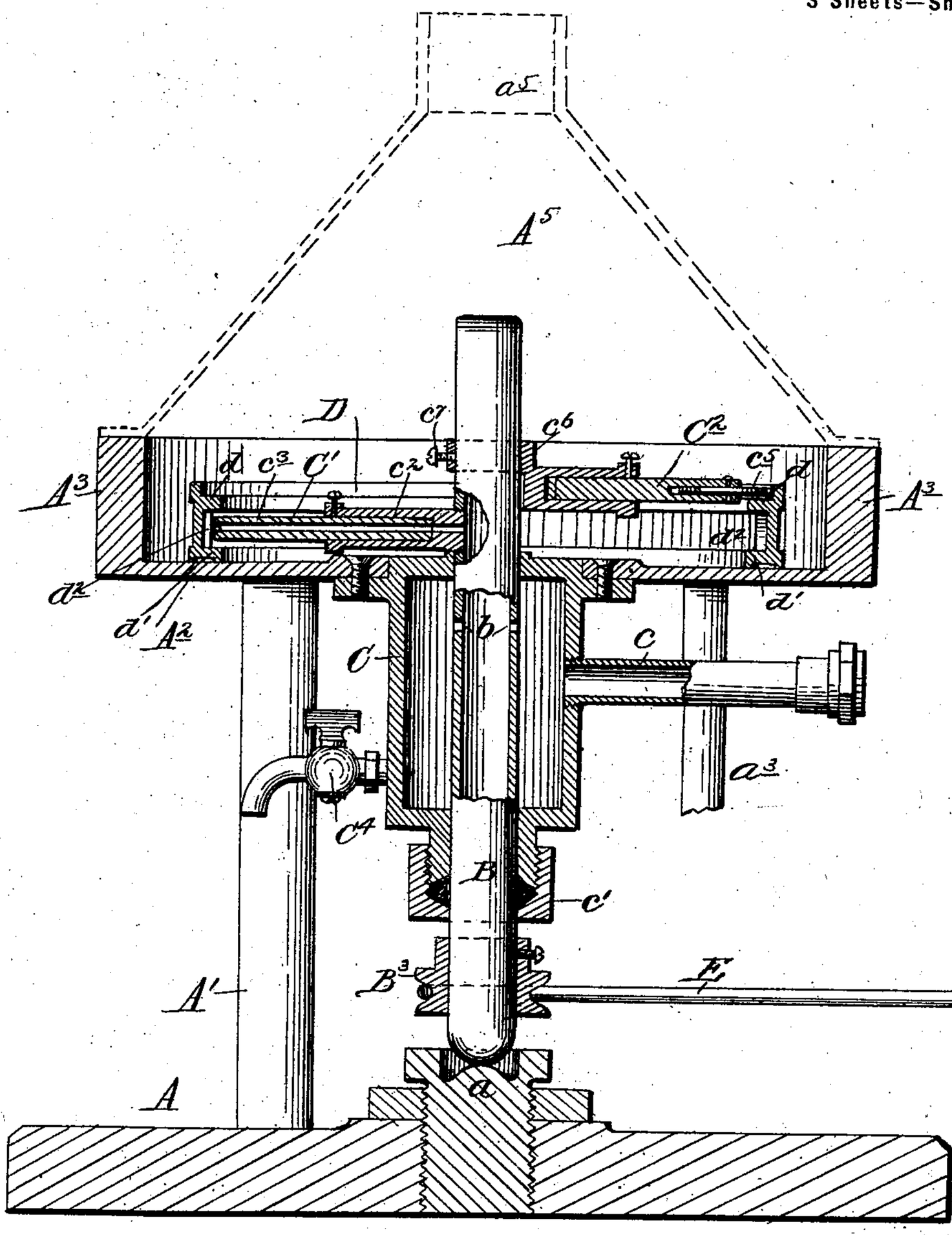

Fig. 3.

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UNITED STATES PATENT OFFICE.

THOMAS J. BUSH, OF LEXINGTON, KENTUCKY.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 709,961, dated September 30, 1902.

Application filed March 24, 1902. Serial No. 99,700. (No model.)

To all whom it may concern:

Be it known that I, THOMAS J. BUSH, a citizen of the United States, residing at Lexington, Fayette county, Kentucky, have invented certain new and useful Improvements in Rotary Engines, of which the following is a specification.

My invention relates to rotary engines of the class in which steam or compressed air acts on the moving part.

The objects of the invention are to provide a simple and inexpensive rotary engine of few parts and in which the moving parts are all exposed to view for removal, cleaning, oiling, &c.; also to provide a rotary engine in which the actuating fluid is delivered from a rotary member against a loose horizontally-disposed lever-forming ring or band eccentrically disposed within a fixed circular fulcrum ring or band and acting upon a transmitting arm or lever carried by said rotary member to cause the same to be rotated and act as the driving pulley or means of the engine. These objects I accomplish by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a perspective of my improved rotary engine, parts being broken away. Fig. 2 is a plan thereof with parts in section. Fig. 3 is a central vertical section thereof on line 3 3, Fig. 2. Fig. 4 is a detail view showing a modified form of lever-ring.

A designates the base of the engine or motor frame, which may be secured to the floor or any suitable support, and from this base rise the standards A′, supporting at their upper ends the centrally-apertured horizontal supporting-plate A^2, provided with a circular flange or fulcrum-ring A^3. The base A is further provided with a central vertically-adjustable externally-threaded socket *a*, in which is stepped the lower end of the rotary vertical steam or air pipe B, the upper end of which extends up through the center of the plate A^2, said pipe being provided below said plate with an inlet *b*.

C is the steam or air cylinder or chamber, bolted or otherwise secured upon the under side of plate A^2 and receiving the actuating fluid through a pipe *c*. This cylinder or chamber C is provided with any suitable form of packing-gland *c′* where the pipe B passes through it, and the opening *b* in the pipe opens into this cylinder.

C′ designates a discharge-pipe projecting from the pipe B and having an oblique port $c^\times$ in its outer beveled end to discharge the operating fluid against the inner wall of what may be termed a "lever forming ring or band" D, supported loosely upon the horizontal plate A^2. The port $c^\times$ extends in a direction contrary to the direction of rotation of the pipe C, so as to prevent any reactive moment from being established by the back pressure of the operating fluid. By this arrangement of the port $c^\times$ I get a reactionary effect upon the end of pipe C′ as well as an impact upon the lever-ring. The power from the lever-forming ring D is transmitted to the rotary pipe or transmitting member B to rotate the same by means of a radial arm C^2, which is provided at its outer end with an antifriction roller or wheel c^5, which engages the inner wall of the said lever-forming ring D, this lever-arm C^2 being in squared telescopic sections c^2 c^3 to prevent rotary movement one within the other, and the outer section is held in its adjusted positions by means of a screw c^4. The radial arm C^2 is provided with a collar c^6, having a screw c^7, by means of which the arm may be held in its proper position on the rotary member or pipe B. The forward side of the discharge end of this pipe C′ lies very close to the lever-ring D and, together with the lever-arm C^2, always keeps a part of said ring D between said pipes and lever-arm against the fulcrum-ring A^3, so that as the issuing fluid presses against the ring D and the latter is forced outwardly at the point where the fluid impacts the ring D will apply the same force to the outer end of the arm C^2 in a direction centripetal to the ring D and cause said arm to rotate the cylinder or head C. Thus the lever-forming ring D is continuously and slowly rolled on its periphery about the fulcrum-flange A^3 in the direction of the arrow *x*, while the rotary pipe or member B is rotated in the direction of the arrow *x′*, and while the lever-ring is thus being gradually rolled in the direction of the arrow *x* it will be slid outwardly on the supporting-plate A^2 as the impact-point of the fluid changes by the rotary movement of the

pipe B. It will be noticed that the lever-forming ring D is provided with upper and lower flanges d d' and is corrugated between these flanges, as shown at d^2, to receive the impact of the issuing fluid. The antifriction-wheel engages the plain portion d^2 of the ring above the flange d. The vertical adjustment of the pipe B is effected by means of its step-bearing a, and the similar adjustment of arm C^2 is effected by its collar and screw c^6 c^7. In Fig. 4 the ring D has a plain inner wall. The power from the pipe B is transmitted from its pulley B^3 by means of a suitable belt E, or any form of gearing may be employed.

The discharge-pipe C' is in telescopic sections c^2 c^3, squared to prevent rotating one within the other, and the outer section is held in its adjusted position by a set-screw c^4. The pipe C' and arm C^2 are preferably adjusted at an angle of about forty-five degrees to one another.

It will be seen that the lever-forming ring D and the rotary member C and its connected parts may be readily oiled or removed when necessary and that worn or broken rings D may be readily replaced by others, and, moreover, all of the parts are exposed to view, and no slide or rotary valve mechanisms are necessary.

The cylinder C is provided with a cock C^4 for drawing off the water of condensation, and a pipe a^3 leads from the plate A^2 for the same purpose. A hood A^5, having an exhaust-opening a^5 in its top, may also be provided, as shown in dotted lines, Fig. 3.

What I claim is—

1. The combination, with a horizontal support provided with an annular fixed fulcrum, of a lever-forming ring resting loosely on said support eccentric to and fulcruming at its periphery against the inner wall of said annular fulcrum, a rotary means for discharging fluid under pressure against the inner wall of said ring at one side of its fulcrum-point, and means extending from the said ring at the other side of its fulcrum-point to the said rotary fluid-supply to rotate it from said ring.

2. A rotary engine or motor comprising, a fixed horizontal plate or support provided with a fulcrum ring or band, of a lever-forming ring engaging and of less diameter than the fulcrum-ring and resting loosely on said plate or support, a rotary fluid pipe or member arranged centrally of said plate or support and provided with a radial discharge-pipe having its outlet end in close proximity to the inner wall of said lever-forming ring, and a lever-forming arm projecting radially from said fluid pipe or member and engaging at its outer end the inner wall of said lever-forming ring; whereby the pipe or member will be rotated to form a drive means or shaft.

3. A rotary engine or motor comprising, a fixed horizontal plate or support provided with a fulcrum ring or band, and a lever ring or band engaging and of less diameter than the fulcrum-ring and resting loosely on said plate or support, of a central vertical rotary fluid-supply pipe projecting up therethrough and having an inlet-opening, a fluid cylinder or chamber surrounding the pipe at its inlet and having a fluid-supply, a radial discharge-pipe extending from said rotary pipe or member into close proximity to the inner wall of said lever-forming ring, and a radial lever-arm projecting from said cylinder and provided at its outer end with an antifriction-roller engaging the inner wall of said lever-forming ring.

4. A rotary engine or motor comprising, a fixed horizontal plate or support provided with a fulcrum ring or band, and a lever ring or band engaging and of less diameter than the fulcrum-ring and resting loosely on said plate or support, of a central vertical rotary fluid-supply pipe projecting up therethrough, a fluid cylinder or head through which said pipe passes and is supplied with fluid therefrom, a radial discharge-pipe extending from said pipe into close proximity to the inner wall of said lever-forming ring, and a radial longitudinally-extensible lever-arm projecting from said pipe and provided at its outer end with an antifriction-roller engaging the inner wall of said lever-forming ring.

5. A rotary engine or motor comprising, a fixed horizontal plate or support provided with a fulcrum-forming ring on its upper side, a lever-forming ring smaller than and engaging said fulcrum-ring, a rotary fluid-supply pipe projecting up through the center of said plate or support, a fluid-supply cylinder on the under side of said horizontal plate and through which said rotary pipe passes, a discharge-pipe extending radially from said cylinder into close proximity to the inner wall of said lever-forming ring and formed in telescopic sections, and a radial lever-arm having an antifriction device at its outer end also engaging the inner wall of the said lever-forming ring and serving to rotate said rotary pipe therefrom.

6. A rotary engine or motor comprising, a base, standards projecting therefrom, a horizontal plate or support on the upper ends of the standards, a circular fulcrum-ring on the upper side of said plate or support, a vertical rotary pipe extended from the base up through the center of said plate or support, an adjustable bearing on the base for the lower end of said pipe, a cylinder or chamber through which the pipe passes and supplying it with fluid, a lever-forming ring resting loosely on said plate and in peripheral engagement with and of smaller size than the fulcrum-ring, a discharge-pipe extending radially from the rotary pipe into close proximity to the said lever-forming ring, and a radial lever-forming arm also projecting from the rotary pipe and having an antifriction device at its outer end in contact with the inner wall of the lever-forming ring.

7. A rotary engine or motor comprising, a

horizontal plate or support having a circular fulcrum-forming ring or flange, a lever-forming ring resting loosely on said plate or support, of less size than the fulcrum-ring and in peripheral engagement therewith; the inner wall of said lever-forming ring being provided with corrugations or pockets and a plain portion, a rotary fluid pipe or member at the center of said horizontal plate or support and provided with a radial discharge-pipe extending at its discharge end into close proximity to the corrugations or pockets of the lever-ring, and a lever-arm also projecting radially from said rotary pipe and provided at its outer end with an antifriction device engaging the plain portion of the lever-forming ring.

8. The combination, with a horizontal support provided with an annular fixed fulcrum, of a lever-forming ring resting loosely on said support, eccentric to and fulcruming at its periphery against the inner wall of said annular fulcrum, and a rotary pulley-forming or power-transmitting device provided with a radial actuating-arm engaging the inner wall of said lever-forming ring at one side of its fulcrum-point and a radial pipe or conductor also projecting from said pulley-forming or power-transmitting device close to the inner wall of said lever-forming ring at a point to the other side of its fulcrum; the constant power or force from said pipe or conductor serving to roll the lever-ring on its fulcrum and in so doing causing the ring to rotate the pulley or power transmitting device through the medium of its actuating-arm.

9. The combination, with a horizontal support provided with an annular fixed fulcrum, of a lever-forming ring resting loosely on said support, eccentric to and fulcruming at its periphery against said annular fulcrum, and a rotary pipe or power-transmitting member provided with a radial actuating-arm engaging the inner wall of said lever-ring at one side of its fulcrum-point, and a radial pipe also projecting from said rotary pipe or transmitting device close to the inner wall of the lever-forming ring at a point to the other side of its fulcrum-point; the outer end of the radial pipe being provided with an inclined port discharging the fluid against the lever-ring in a direction contrary to the direction of rotation of said rotary pipe or member.

In testimony whereof I affix my signature in presence of two witnesses.

THOMAS J. BUSH.

Witnesses:
P. J. SHERRY,
C. W. WEST.