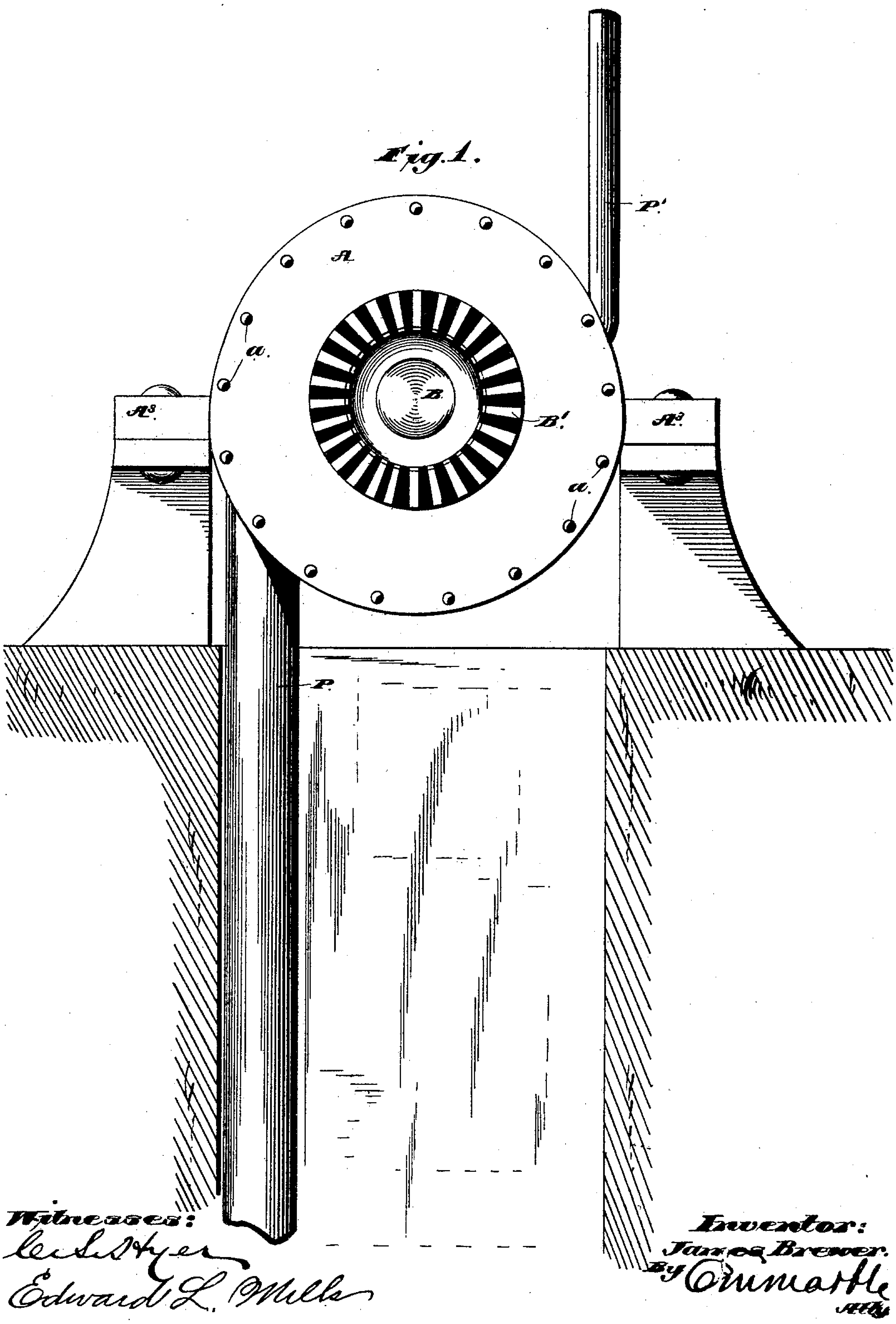
(No Model.) 3 Sheets—Sheet 1.

J. BREWER.

ROTARY PUMP.

No. 353,199. Patented Nov. 23, 1886.

Fig. 1.



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(No Model.)

3 Sheets—Sheet 2.

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Fig. 2b.

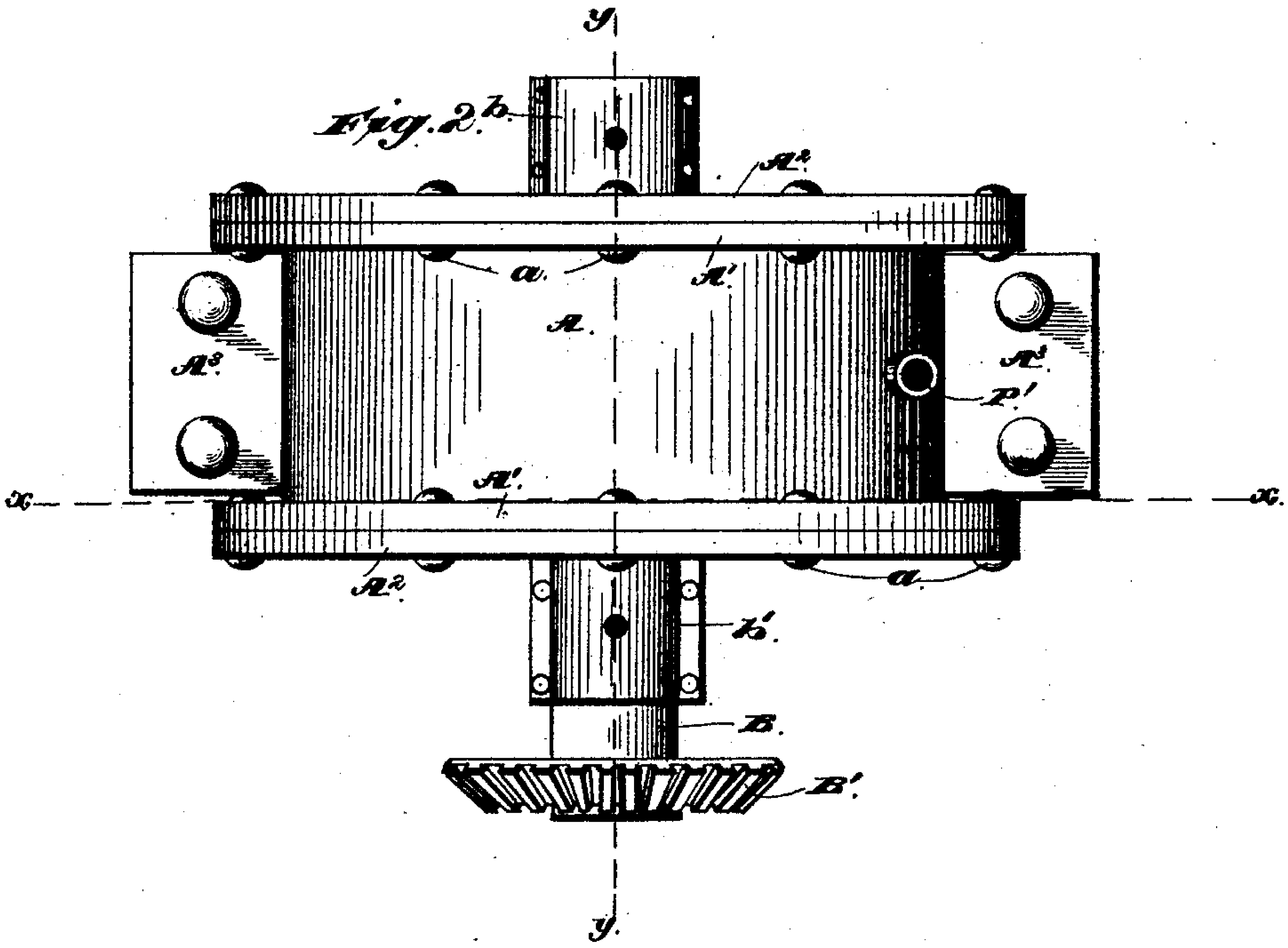
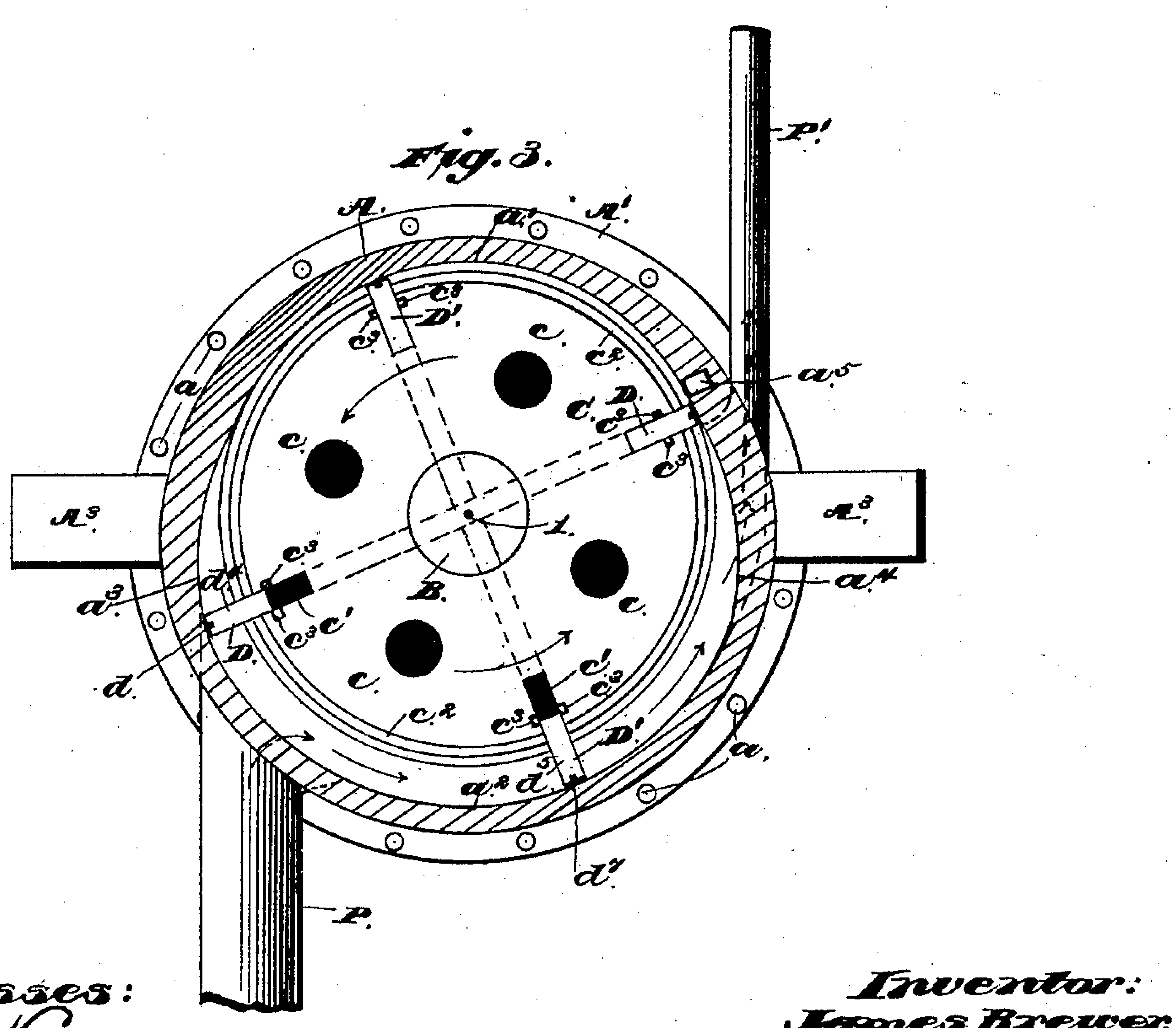


Fig. 3.



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(No Model.) 3 Sheets—Sheet 3.

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Fig. 4.

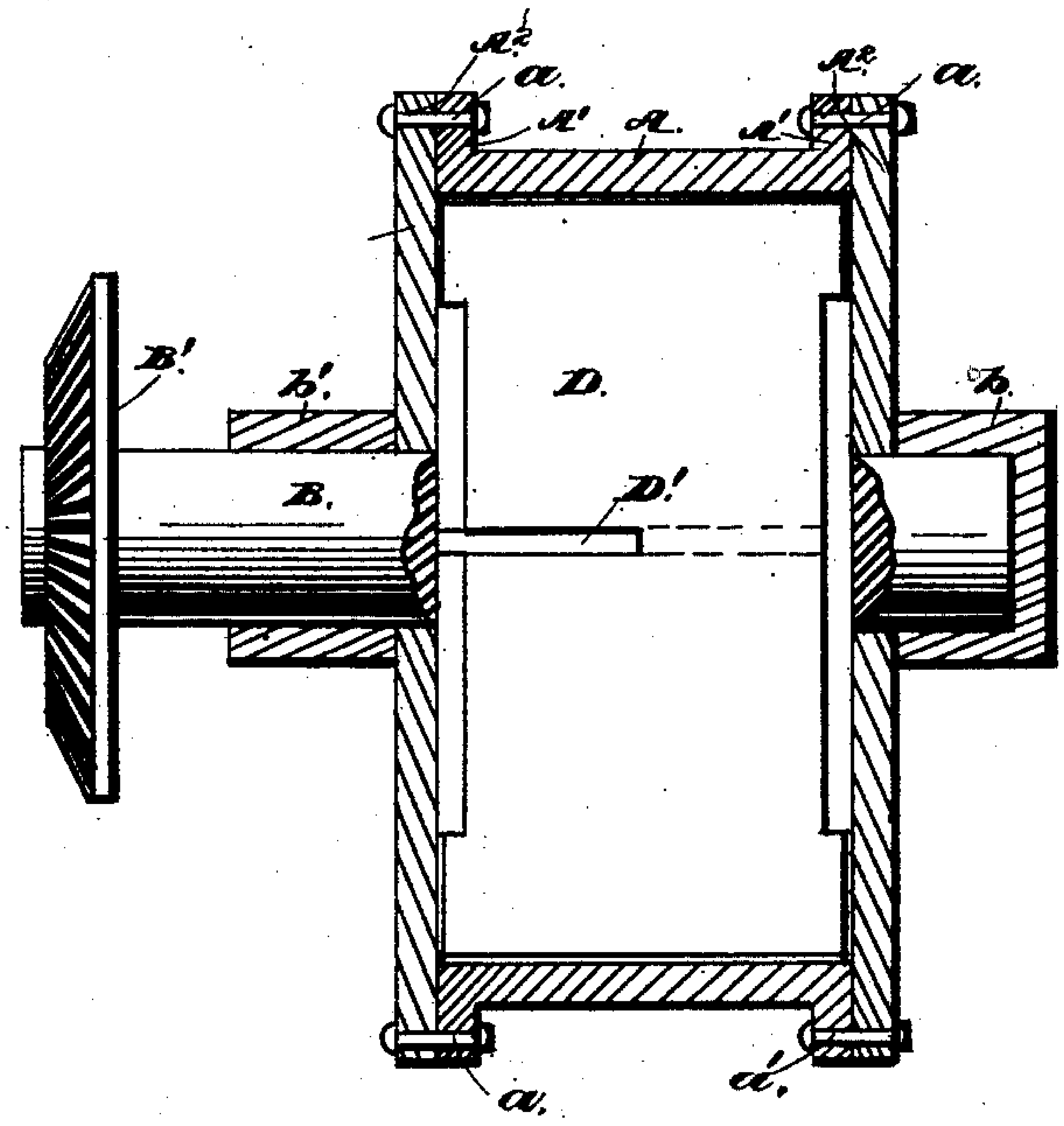


Fig. 5.

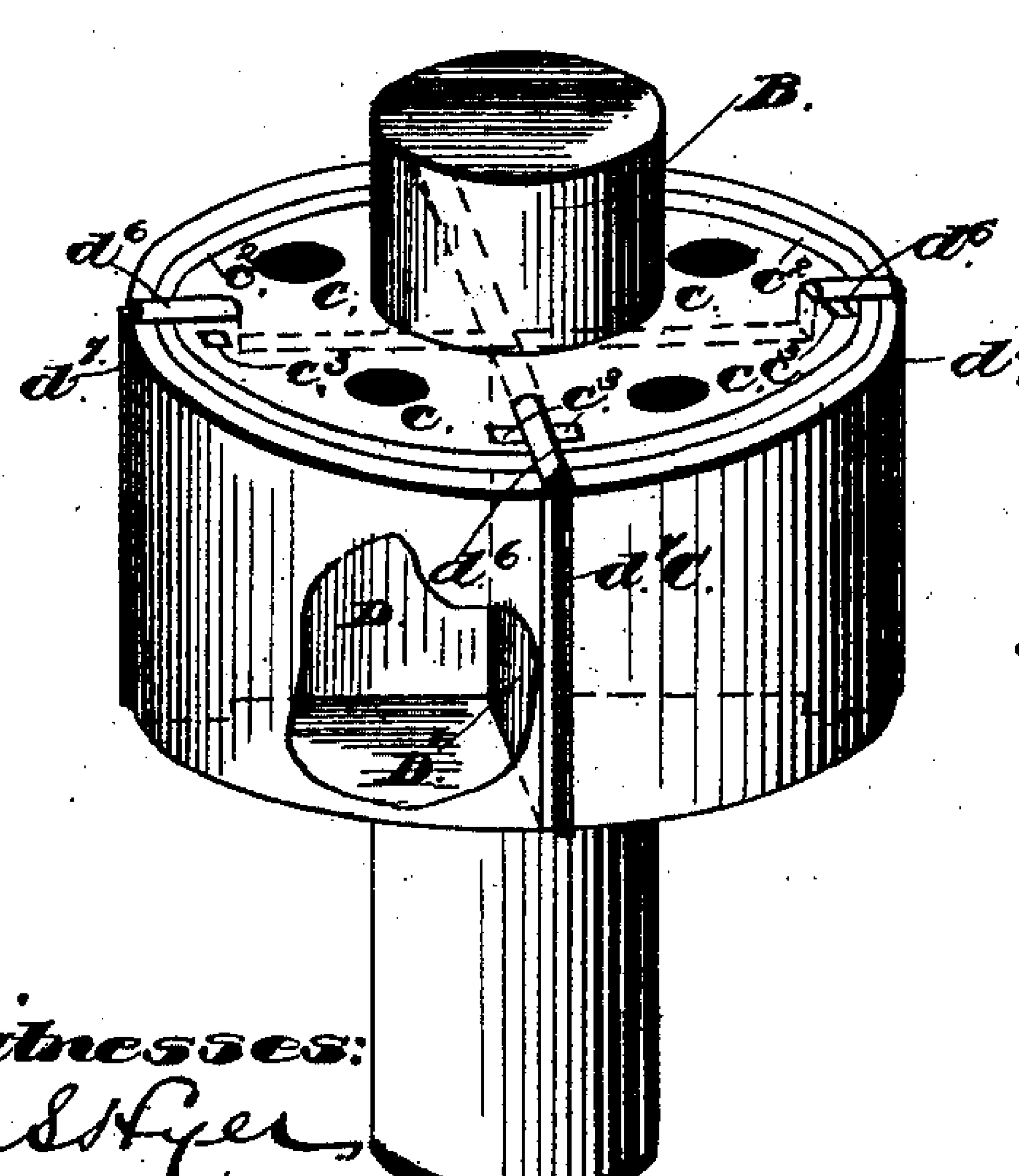
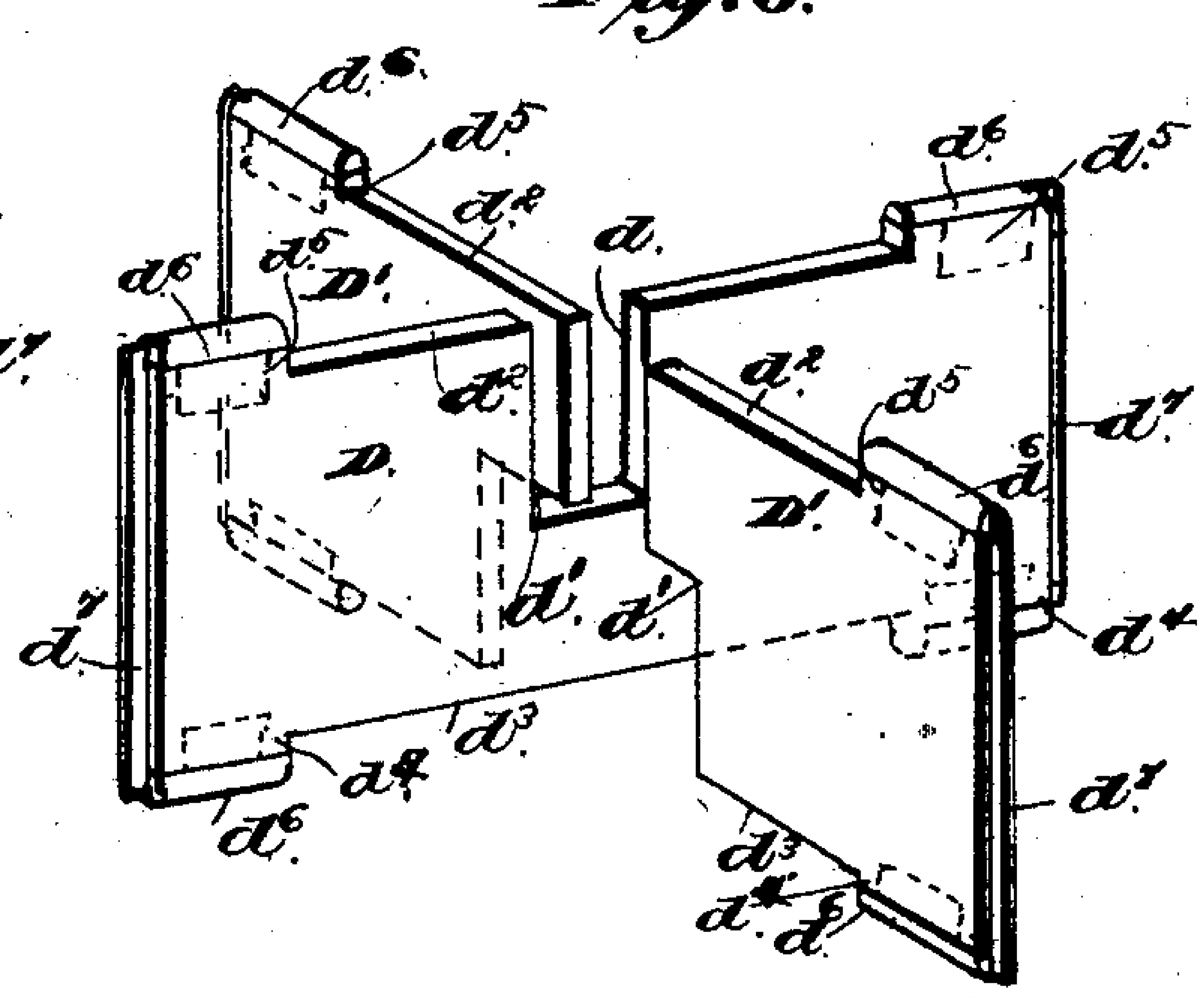


Fig. 6.



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UNITED STATES PATENT OFFICE.

JAMES BREWER, OF PUEBLO, COLORADO.

ROTARY PUMP.

SPECIFICATION forming part of Letters Patent No. 353,199, dated November 23, 1886.

Application filed June 12, 1886. Serial No. 204,962. (No model.)

To all whom it may concern:

Be it known that I, JAMES BREWER, a citizen of the United States, residing at Pueblo, in the county of Pueblo and State of Colorado, have invented certain new and useful Improvements in Rotary Pumps; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to rotary pumps; and it consists in the construction and arrangement of the parts which will be fully hereinafter described, and pointed out in the claims.

One object of my invention is to provide a pump that can be easily and readily operated to throw a continuous stream of water, without jerks or spurts, absolutely air and water tight, and capable of raising water to a great height or distance above or from below the surface of the ground, requiring but little power proportionate to the work accomplished to operate it.

A further object of my invention is to construct the parts of the device in a simple and efficient manner, rendering them in a condition to be easily handled and operated, applicable to any desired use, and readily transported.

I attain these objects by the mechanism illustrated in the accompanying drawings, wherein like letters of reference indicate similar parts in the several views, and in which—

Figure 1 is a side elevation of my improved rotary pump as set up for underground drainage. Fig. 2 is a top plan view of the device. Fig. 3 is a longitudinal vertical section on the line *x x* of Fig. 2. Fig. 4 is a transverse vertical section on the line *y y* of Fig. 2. Fig. 5 is a detail perspective view of the drum and shaft with the piston-wings in connection therewith. Fig. 6 is a detail perspective view of the piston-slides.

A indicates the outer shell or casing, having securing-flanges A′ on each of its sides, which engage with the heads A^2, being secured by bolts *a*. The ends of the shell A have lugs A^3 cast therewith, which are adapted to be attached to a suitable supporting framework. A shaft, B, cast integral with the internal drum, C, passes through the heads A^2. The ends of the shaft B extend outside of the heads A^2, one end thereof being supported by a journal, *b*, on one side of one of the heads, and the other end passing through a journal, *b′*, which may have suitable stuffing-boxes fitted therein. The shaft B, on the side of the journal *b′*, extends out from the head adjacent thereto a short distance, and has a suitable power medium mounted thereon, preferably a bevel-gear-wheel, B′, as shown in the drawings.

The shell A has a pipe, P, connected to the under portion thereof for the ingress of water, while a pipe, P′, of smaller diameter is connected to the upper part of the shell for the ingress of the water. The pipe P′ is formed with a elbow extending a short distance away from the shell, so that the water forced up through it will not receive the full resistance of the atmospheric pressure directly on the exit-opening, thereby allowing a somewhat easier upward flow.

The curves of the central wall of the shell, both upper and lower, are struck from a common center, and therefore have the same radii. The radius of the upper wall, *a′*, is shorter than that of the lower wall, a^2, the two curves being connected by short curves struck from different centers than are the said upper and lower walls. These short connecting curves, as shown at the points a^3 and a^4, are of greater inclination than the curves of the upper and lower walls, for a purpose which will be hereinafter described. This series of curves forms an irregular ellipse whose diameter is equal in all directions on a line drawn through the central point, 1. This point 1 is also the central point of the shaft B, upon which is mounted the metallic drum C, which has consequently the same center. The upper part of this drum C rests against the upper part, *a′*, of the internal wall of the shell, and being of shorter diameter than the lower wall, a^2, a space of predetermined width is left between the said lower wall, a^2, and the lower peripheral edge of the drum C. The shaft B passes transversely through this drum C, being cast integral therewith.

Non-frictional piston-slides D D′ pass transversely through the drum C and shaft B at right angles to each other, thereby dividing the said drum into quadrangular sections *c*, which are cast hollow, as shown in Figs. 3 and

5, leaving the heads, peripheral surfaces, and divisional walls on each side of the piston-slides D and D′ of suitable thickness to resist the hydraulic strain exerted thereon. A series of openings, c', is cut through each head of the drum C, which extend back a short distance from the peripheral edge of said drum, the remaining portions of the said heads being constructed in the form of a web, which extends to the shaft B, forming a solid top wall on each side of the drum. The peripheral walls of said drum are also solid, except at the points where slots are formed for the passage of the piston-slides D and D′, said slots extending across the entire peripheral surface or walls. The quadrangular sections are thus provided with a wall on each side, the internal portion being left hollow and constructed by means of a core-casting. By this means a lighter as well as a stronger and more durable construction is obtained.

As shown in Fig. 6, one of the piston-slides, D, is constructed of a single piece of metal, and the other slide, D′, of two sections, which if united will be of the same length as the slide D. The slide D has a slot, d, cut at its central portion, and extending down about midway or below the central point of its width. In like manner the two sections forming the other slide, D′, have slots d' d' cut therein, but reversely to the slot d in the slide D, being cut from the opposite side. These two slots d' d' extend upwardly the same distance as the slot d extends downwardly, and the width of said slots d', when united, corresponds to the width of the slot d. In the upper and lower portions of the slides D and D′ slots d^2 and d^3 are formed, leaving projections d^4 and d^5 on the ends, the depth of said slots or recesses d^2 and d^3 being equal to the thickness of the heads of the drum C, under which the said slots fit and have movement. The projections d^4 d^5 pass up through the openings c', and are flush with the surfaces of the heads of the drum.

Suitable packings are applied to all the parts where it is necessary, the heads of the drum C having a circular packing, c^2, placed close to the peripheral edge of the said drum, which are supported in a groove and rest upon suitable springs. This circular packing c^2 is separated at each of the openings c', so that the projections d^4 and d^5 of the piston-slides D and D′ will have an easy passage through the said openings. The top portions of the projections d^4 and d^5, as well as the peripheral edges of the piston-slides D and D′, are provided with suitable spring-mounted packings, d^6 and d^7, which are fitted in suitable grooves in the parts described, having a thin projection extending into the groove, and the outer portion of packings d^6 being constructed of the same width as the width of the said parts, the packings on the projections extending outward flush with the circular packing c^2, and back toward the central part of the drum a sufficient distance, being limited by a shoulder formed in the said projections.

In addition to the packings just described, supplementary packings c^3, mounted in like manner, are placed just in the rear of the circular packing c^2, adjacent to the openings c', on each side, to prevent any passage or escapement of the fluid to the interior of the drum C.

At the upper portion of the curved wall a^4 a packing, a^5, is mounted, which prevents any pass of the water around through upper portion of the shell. These packings may be of any preferred form of construction and of material adapted for the purpose.

The above construction having been fully carried out, the operation of the device will be as follows: Suitable gearing-power being applied to the bevel-wheel B′, the shaft B, and consequently the drum C, will revolve in the direction indicated by the arrows in Fig. 3. The slides D and D′, passing through the slots cut in the drum C, will alternately be shoved through and project from one side of the peripheral of the said drum as they are brought into contact with the varying curvatures of the interior wall of the shell A. Where the drum is in contact with the upper wall, a', as shown, the piston-slides are shoved through the drum and come in contact with the lower wall, a^2, until they ride around and strike the short curves a^3 and a^4, when they will be gradually shoved through the opposite side of the drum, thus at all times having two ends of the said slides in contact with some portion of the interior wall of the shell, forming closed compartments between said wall, the peripheral edge of the drum, and the sides of the projecting slides. The single piston-slide D passes backward and forward through its slot in the drum C through the slots d' d', formed in the sectional piston-slide D′. The inside ends of the sections of the slide D′, in their reversible sliding movement, strike each other through the slot d, formed in the piston-slide D, producing the same effect upon each other as the walls of the shell do upon the slide D. The slots through which these slides work are constructed of sufficient width to just allow the said slides to pass therethrough and accurately register with each other, the said slides being constructed, as described, so as to easily slide into the drum without the use of unnecessary slots. As the lower wall, a^2, from the lower portions of the short curves a^3 and a^4 is equally distant from the central point, 1, and consequently having the same and equal radii, the slides between these points will extend outward an equal distance. As they reach the lower portion of the short curved wall a^4 of greater inclination they will gradually and smoothly recede from that side of the drum and extend outward from the opposite side thereof. Therefore the said slides D and D′ are so mounted in the drum C that when one side of either piston reaches the lower side of the short wall a^4 the other end of said piston will have just reached the uppermost portion of the curve of the wall a^3, thus causing a gradually-increasing inclination at one end of the slides and a gradual declination at the other end.

As shown in Fig. 1, the pump is illustrated as being set up for raising water from below the surface of the ground. As the piston-slides D and D′ revolve a suction is set up between the rear portion of the said slides and the pipe, and the water drawn up into the compartment formed as heretofore described, and carried around the lower portion of the shell, and as the slide bounding or forming the lower wall of said compartment reaches the lower portion of the short curved wall a^4 of increasing inclination the dimensions of the compartment are decreased by the slide gradually passing through the drum C, and the water forced into and up through the pipe P′ to any suitable place of deposit. By the time that the slide just described has reached the lower portion of the wall a^4 one end of the other slide will have passed the opening of the pipe P, another compartment filled with water is formed, and the operation of suction, lifting, and forcing becomes continuous. By having a column of water behind and resting on each slide its motion is rendered easy in its passage backward and forward through the drum C, due to the equal pressure on each side of each blade by a column of water above and below the same, the lower column of water sustaining the pressure by its non-compressibility.

The parts of the device will all be constructed of a size proportionate to the desired application, and of metal adapted for the purpose, and formed by means well known in the art.

It is obvious that many minor details in the construction and arrangement of the parts could be made and substituted for those shown and described without in the least departing from the nature and principle of my invention.

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

1. In a rotary pump, the combination of a drum provided with circular packing on the exterior of its heads, and having diametric right-angled slots therethrough, piston-slides passing through said slots of a length equal to the distance apart at all points of the walls of the chamber in which the drum is mounted, and a shell or casing inclosing said drum the walls of whose chamber form with the drum a pressure-chamber, and also a continuous track for the ends of the piston-slides, and having ingress and egress openings diagonally opposite to each other at or near the commencement and ending of said pressure-chamber, substantially as described.

2. In a rotary pump, the combination of the shell A, having an elliptical chamber provided with ingress and egress openings, drum C, having diametric slots c', circular packing c^2, and supplemental packing c^3, piston-slides D and D′, provided with packings d^6 and d^7, and means for operating the same, substantially as described.

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

JAMES BREWER.

Witnesses:
CHARLES S. HYER,
EDWARD L. MILLS.