No. 694,333. Patented Feb. 25, 1902.

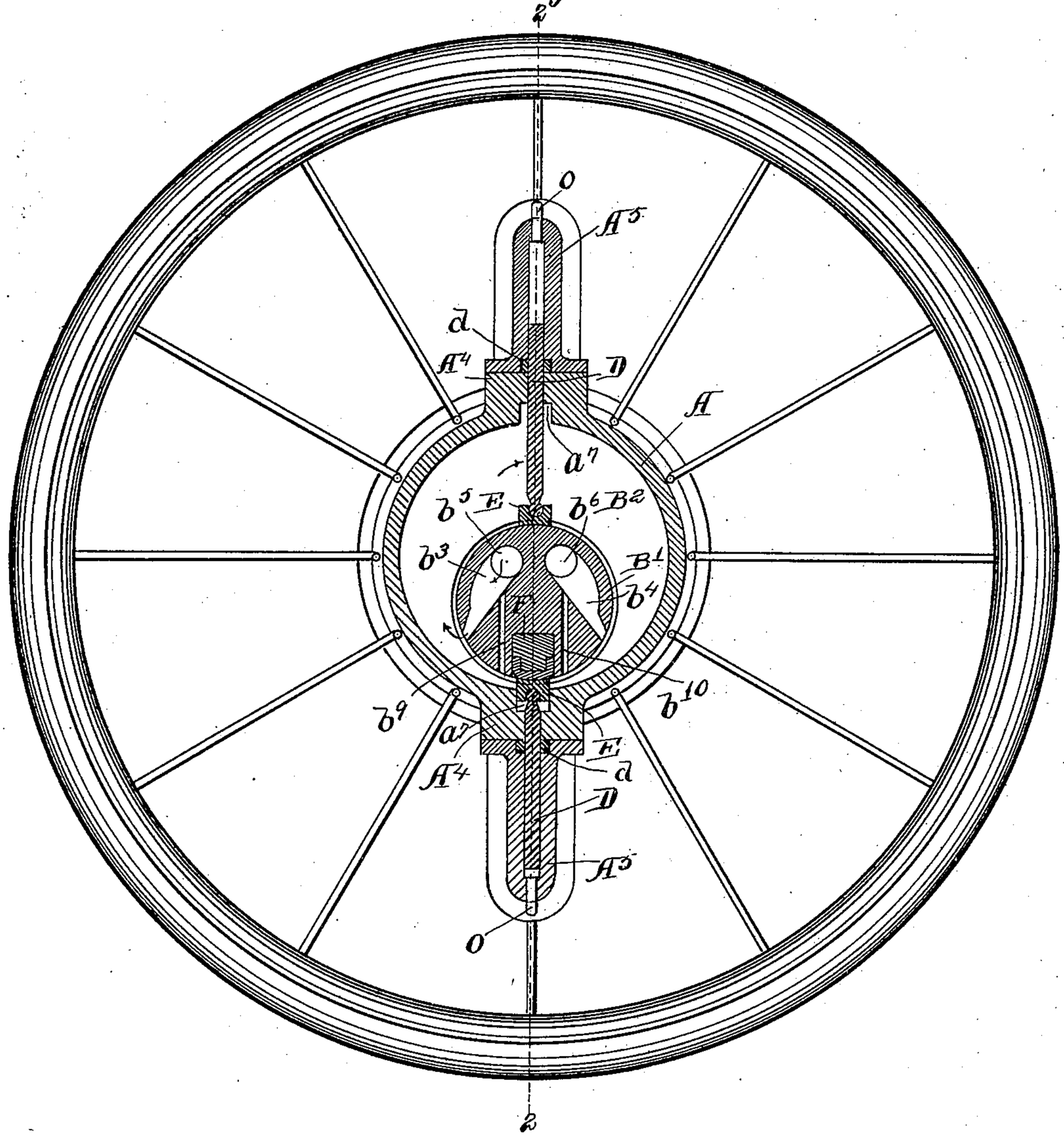
B. V. SZABO.

ROTARY MOTOR.

(Application filed June 24, 1901.)

(No Model.) 6 Sheets—Sheet 1.

Fig 1



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William L. Hall.

Inventor:—
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his Attorneys

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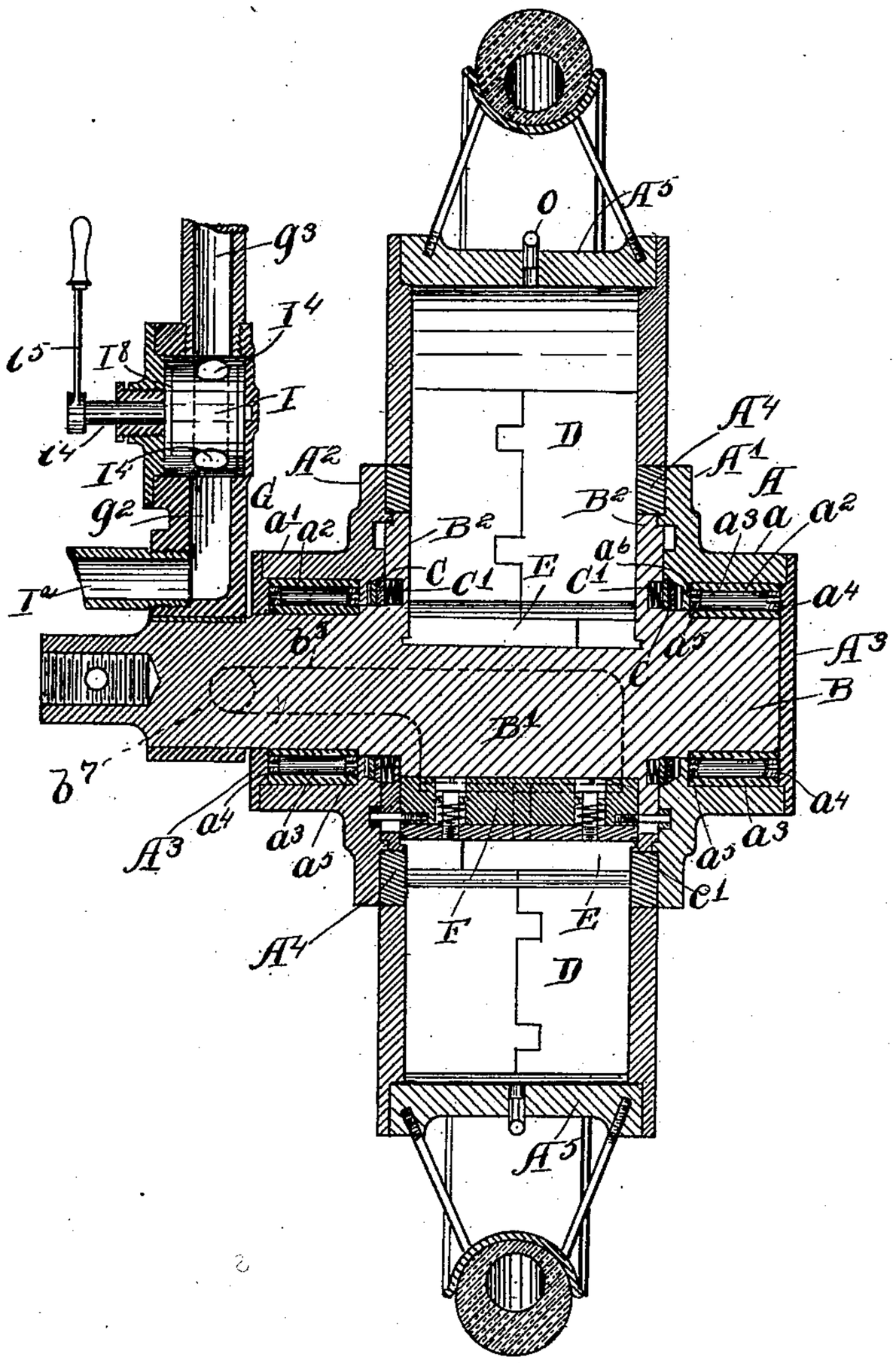
Fig. 2



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(No Model.) 6 Sheets—Sheet 3.

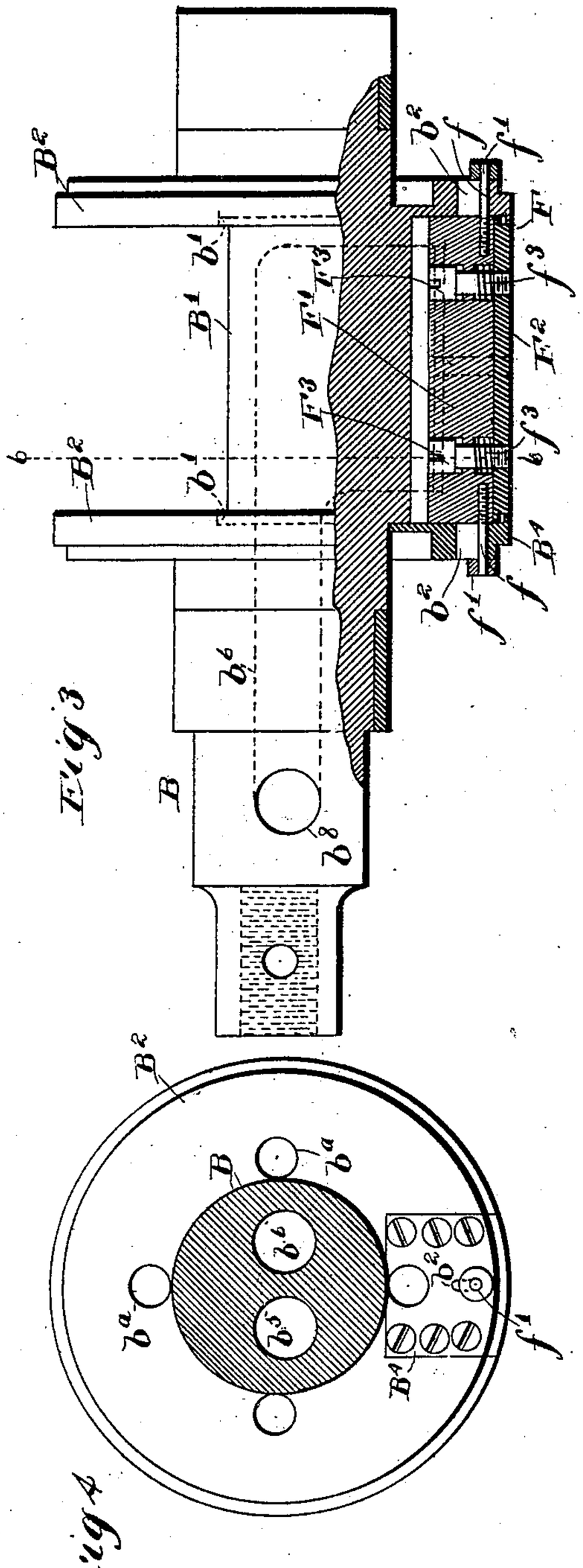

Fig 3

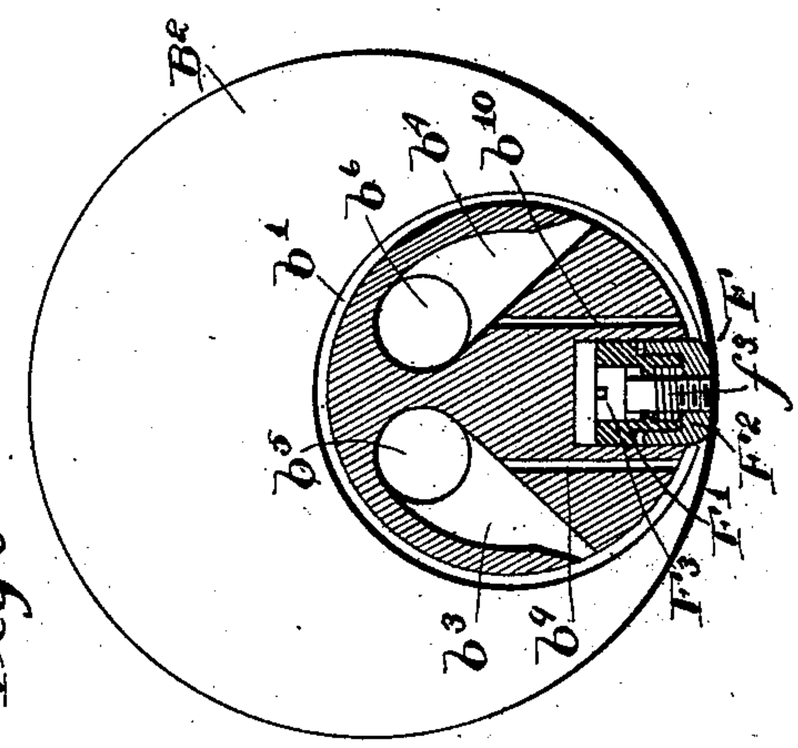

Fig 6

Fig 4

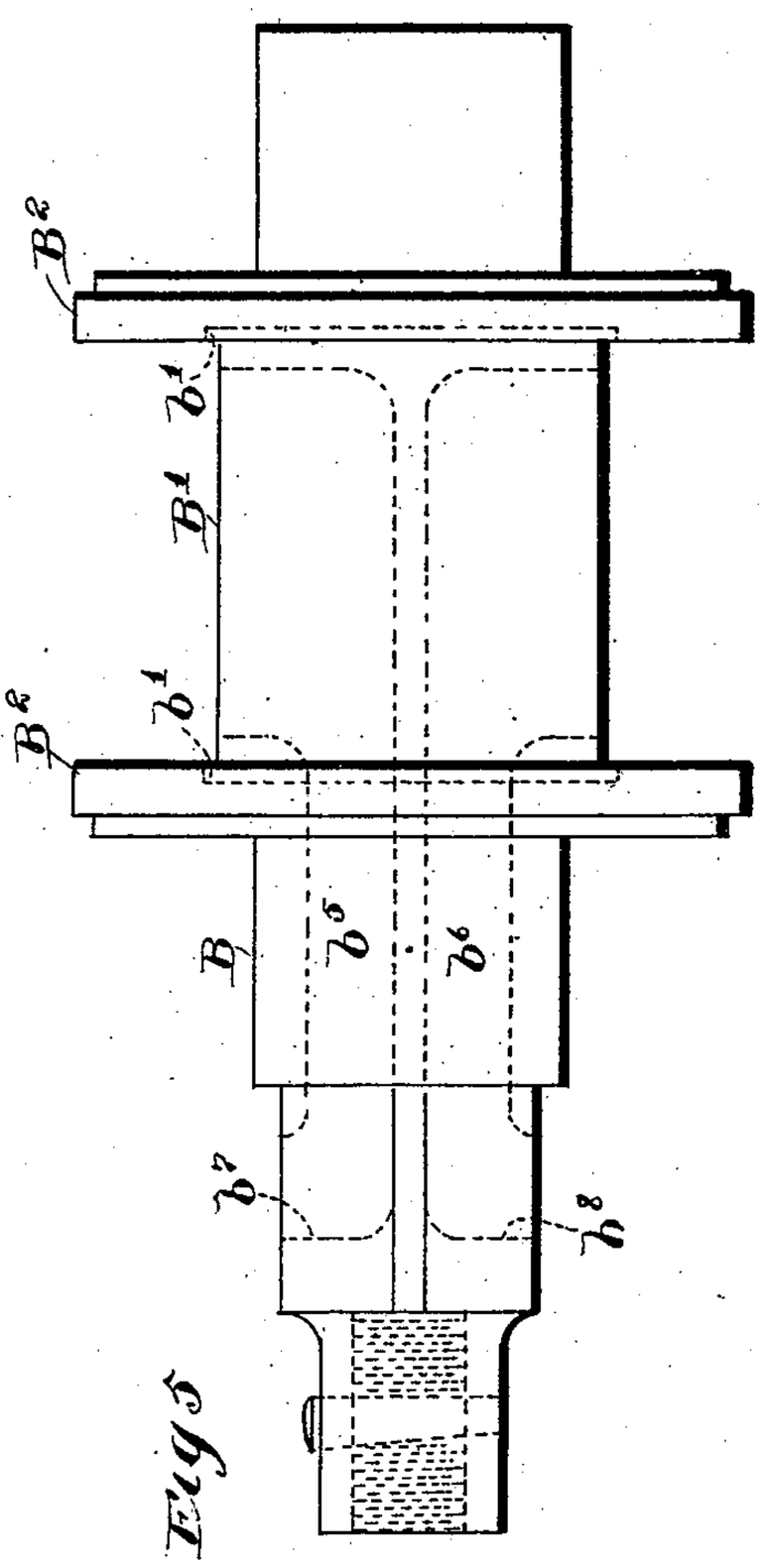

Fig 5

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(No Model.) 6 Sheets—Sheet 4.

Fig. 7

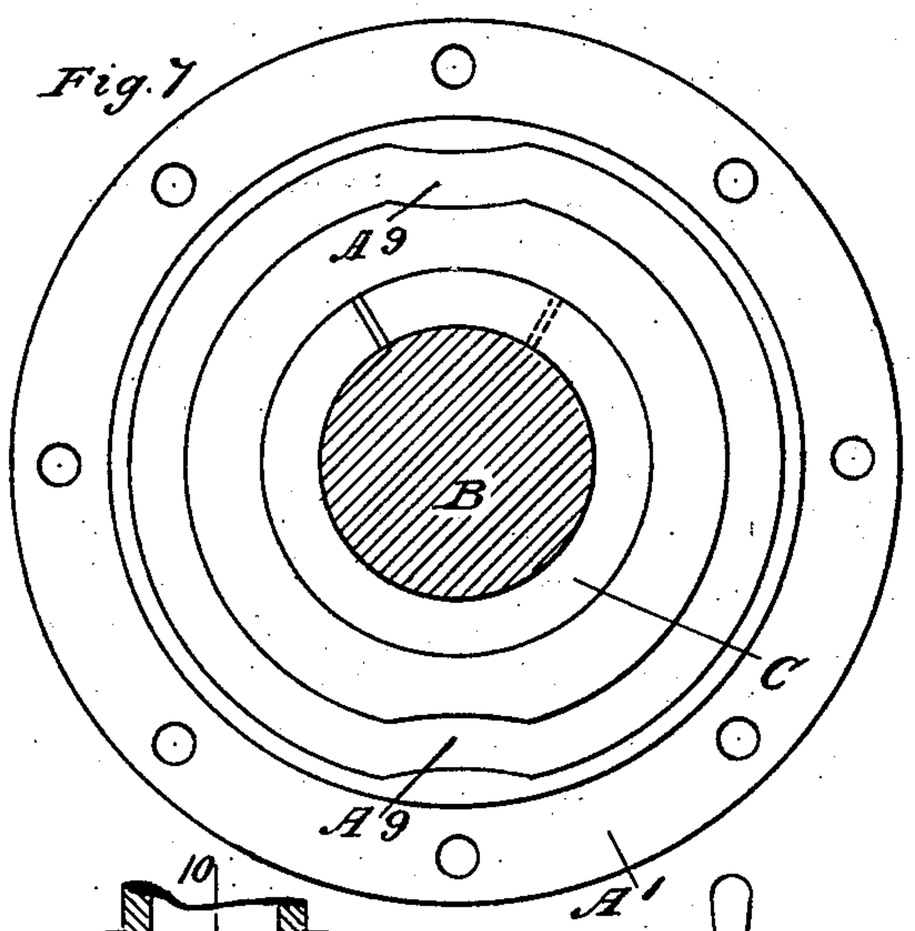


Fig. 8

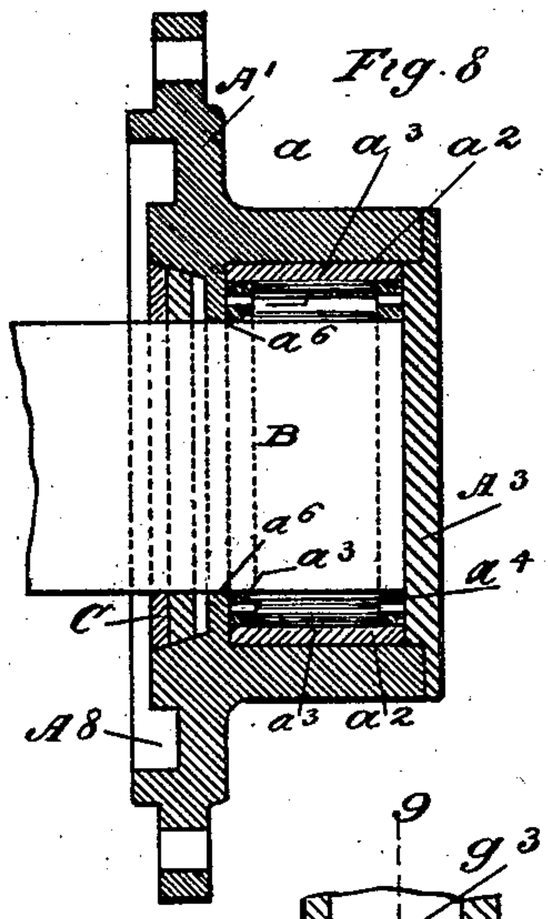
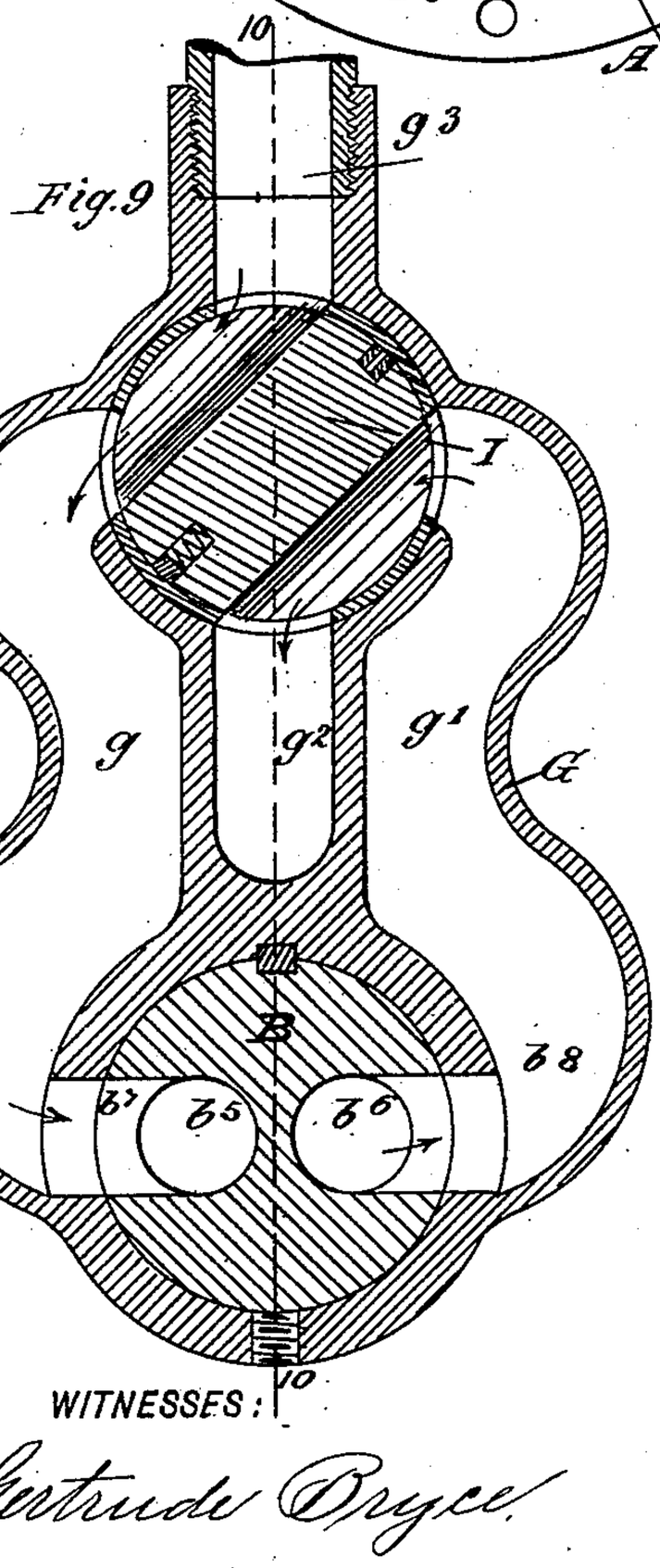


Fig. 9



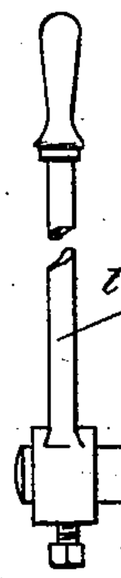
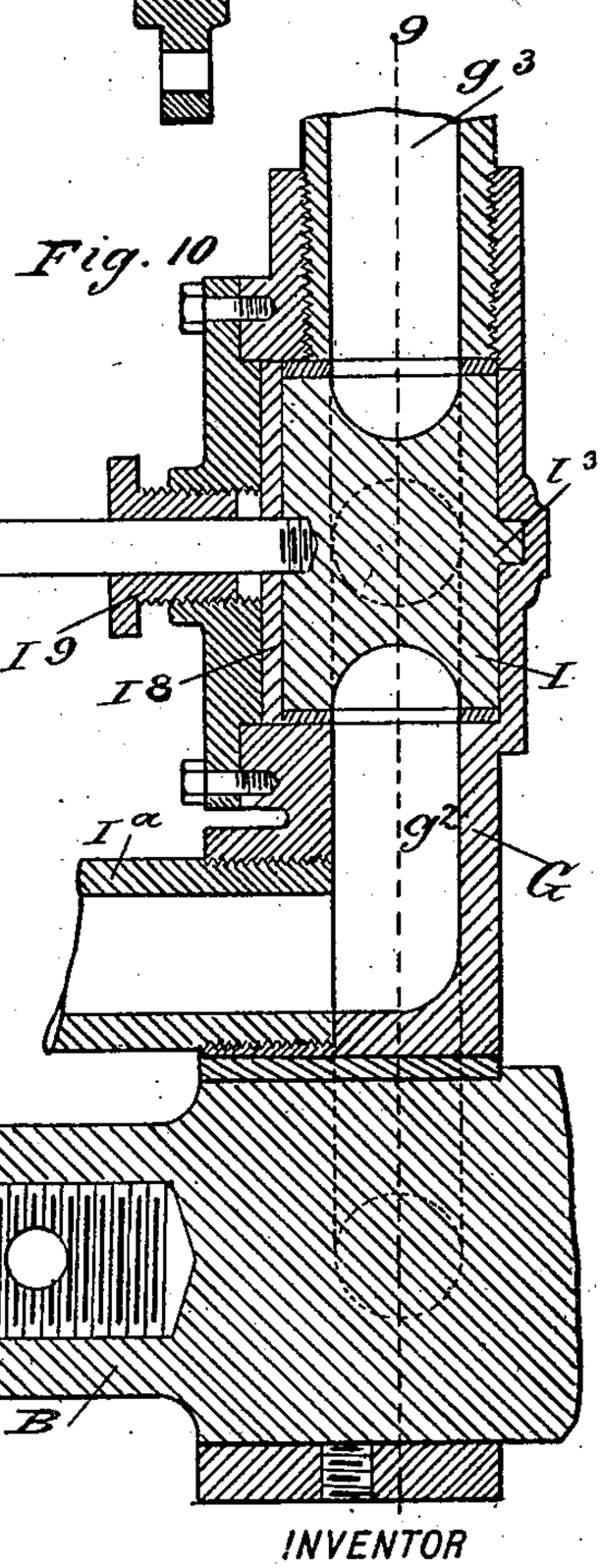


Fig. 10



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Poole & Brown

ATTORNEYS

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(No Model.) 6 Sheets—Sheet 5.

Fig. 11

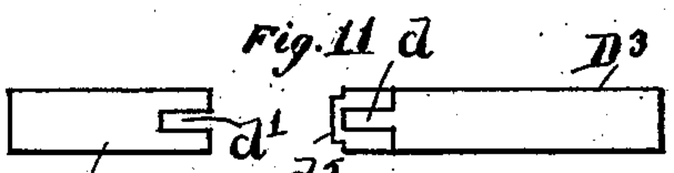


Fig. 12

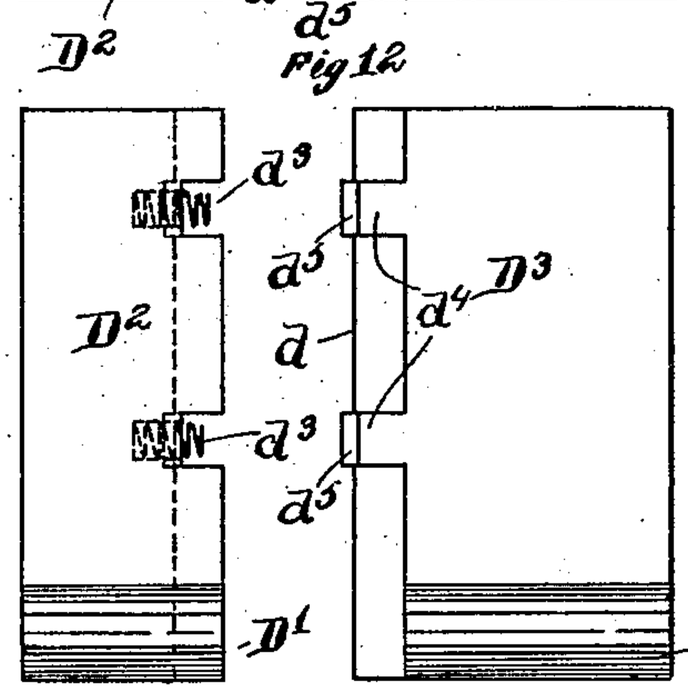


Fig. 13

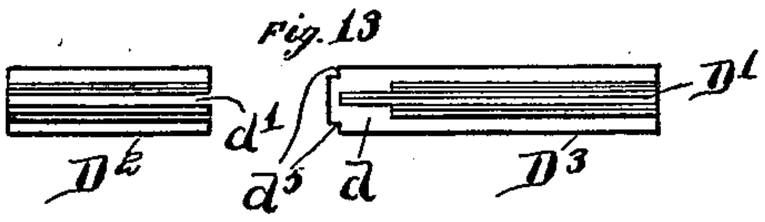


Fig. 14

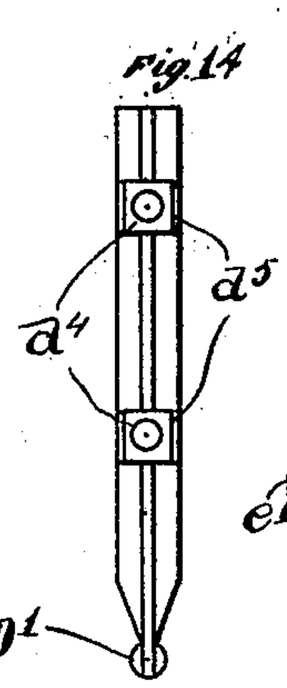


Fig. 15

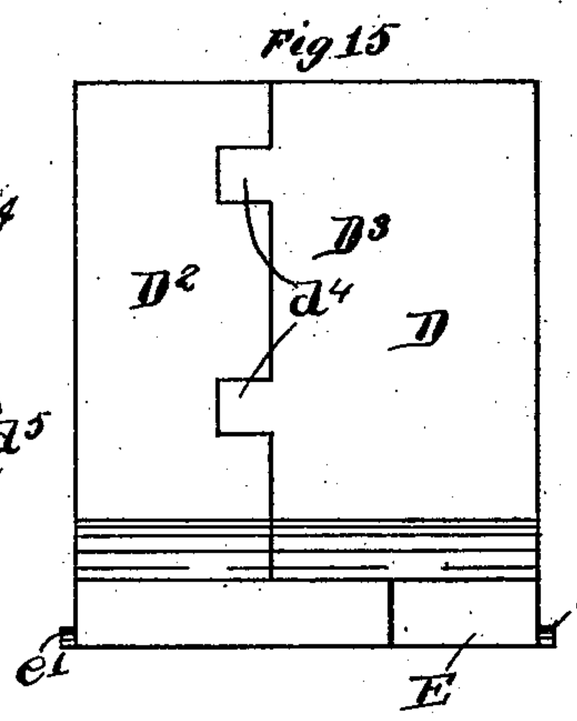


Fig. 16

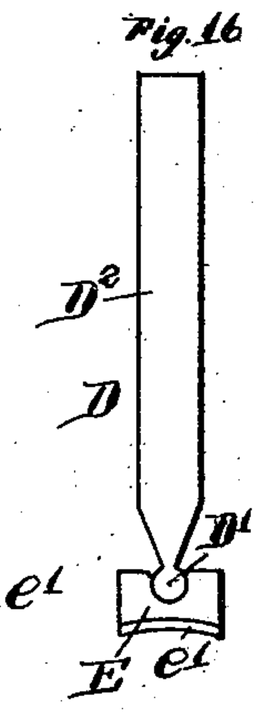


Fig. 17

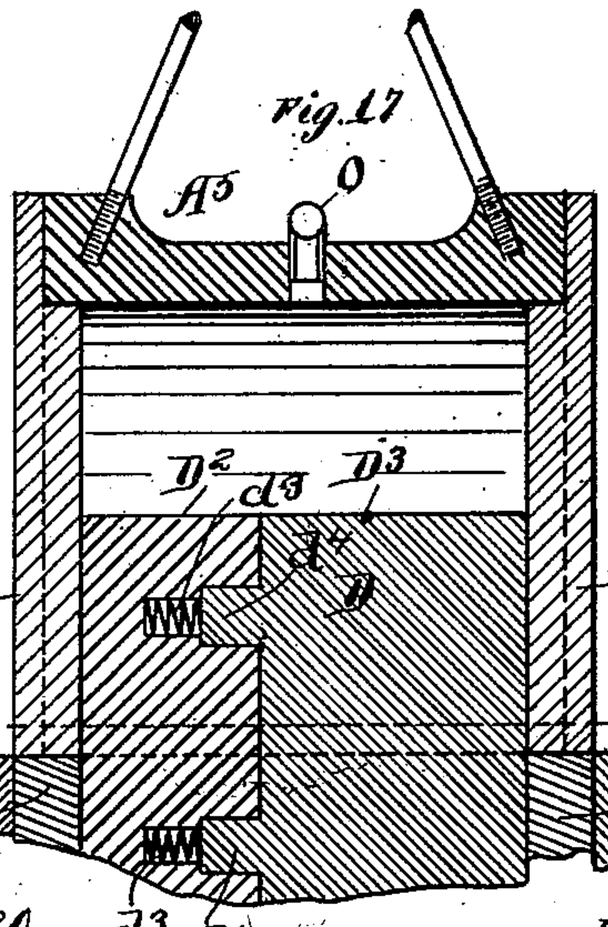


Fig. 18

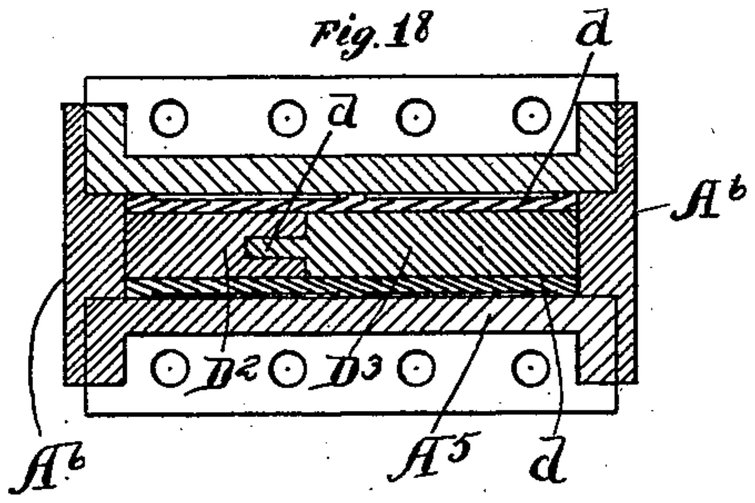


Fig. 19

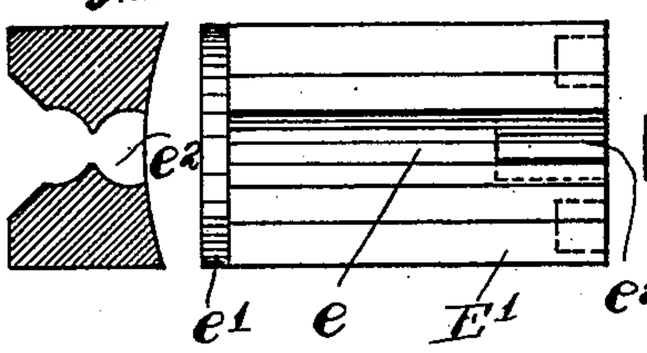


Fig. 20

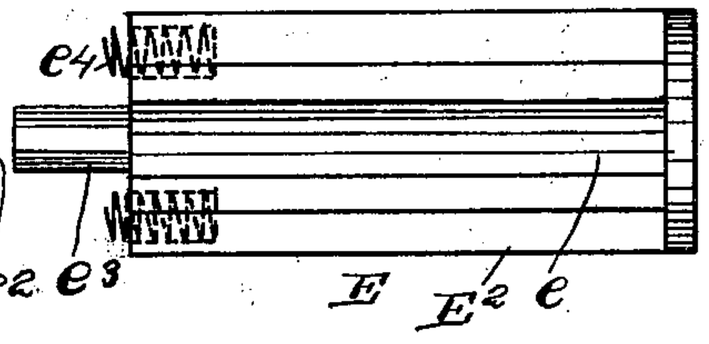


Fig. 21

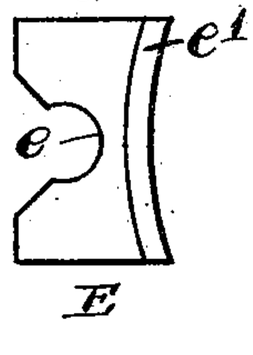
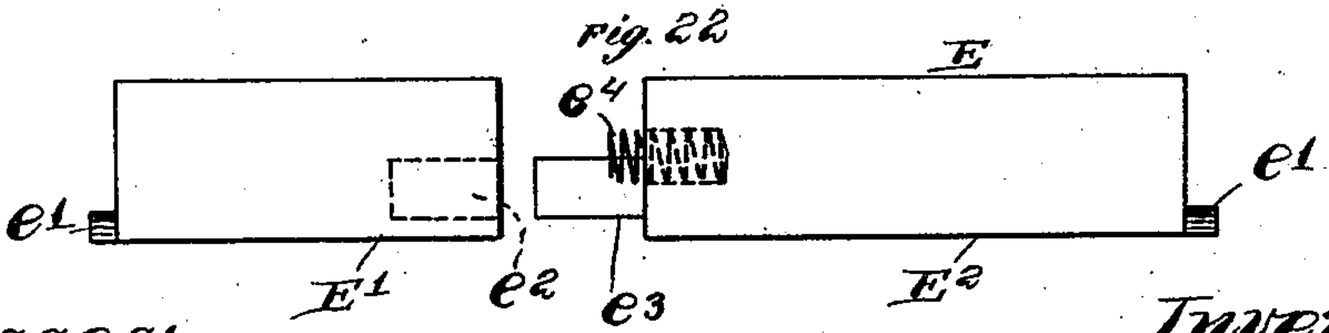


Fig. 22



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ROTARY MOTOR.

(Application filed June 24, 1901.)

(No Model.) 6 Sheets—Sheet 6.

Fig. 23

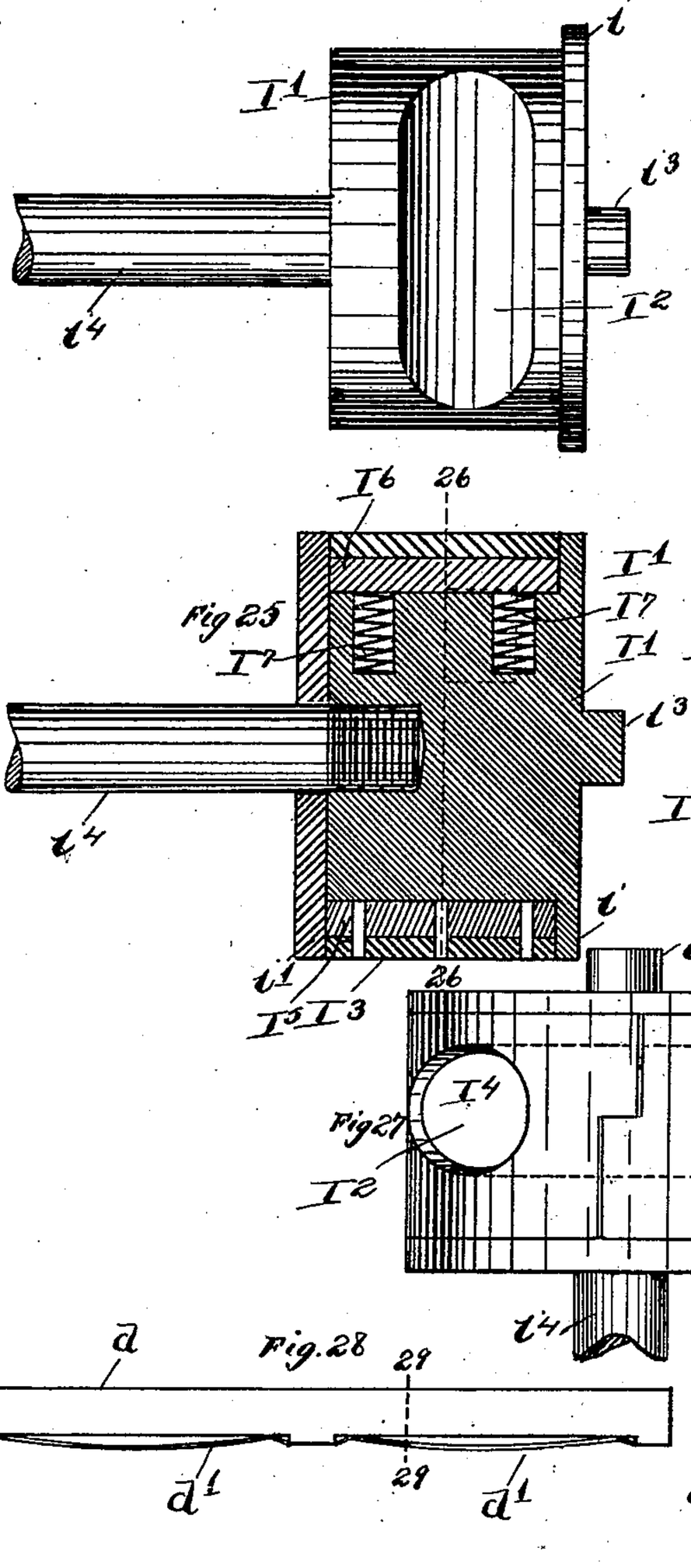

Fig. 24

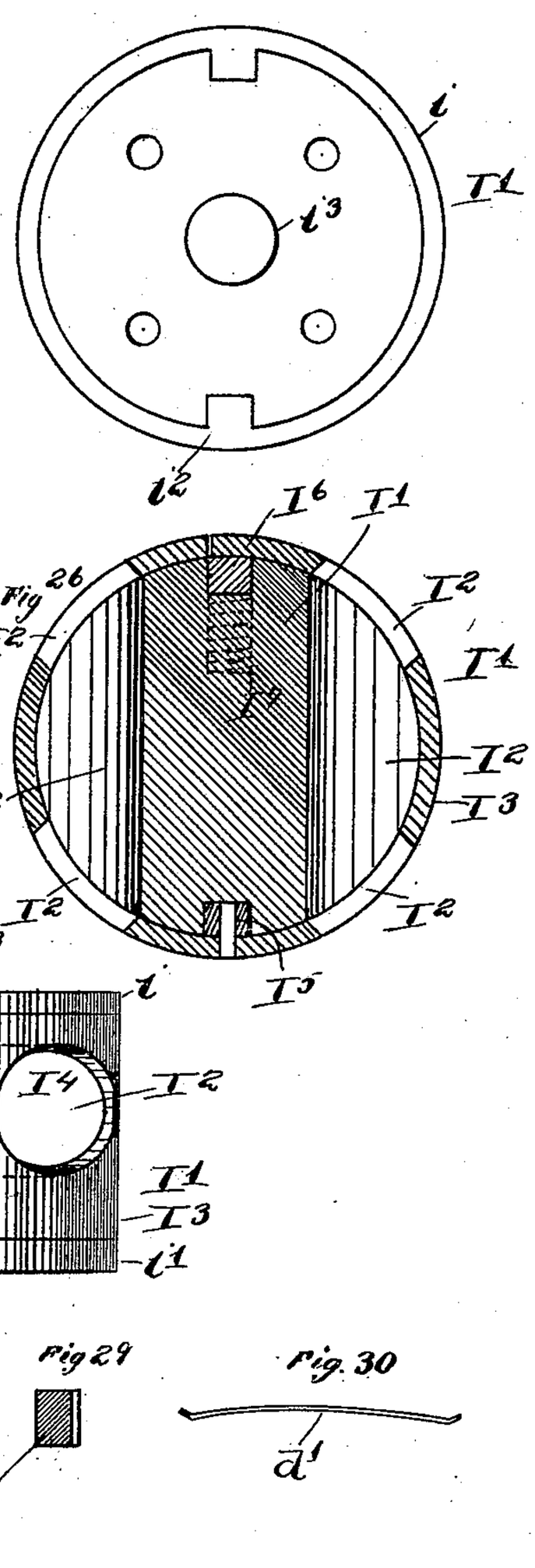

Fig. 28

Fig. 29

Fig. 30

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UNITED STATES PATENT OFFICE.

BASIL V. SZABÓ, OF CHICAGO, ILLINOIS.

ROTARY MOTOR.

SPECIFICATION forming part of Letters Patent No. 694,333, dated February 25, 1902.

Application filed June 24, 1901. Serial No. 65,793. (No model.)

To all whom it may concern:

Be it known that I, BASIL V. SZABÓ, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Rotary Motors; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in rotary motors of the general class shown in my prior application for United States Letters Patent, Serial No. 49,833, filed March 5, 1901; and the invention consists in the matters hereinafter described, and more particularly pointed out in the appended claims.

The improvements constituting my invention are especially applicable for embodiment in a center-wheel or hub motor for a vehicle-wheel or a power-transmitting pulley and is herein shown as applied to a vehicle-wheel.

In the drawings, Figure 1 is a side elevation of a vehicle-wheel provided with a motor embodying my improvements, said motor being shown in transverse section. Fig. 2 is a sectional view taken on line 2 2 of Fig. 1. Fig. 3 is a side elevation, partly in section, of the shaft or central non-rotative part on which the rotative parts of the motor are mounted. Fig. 4 is a transverse section on line 4 4 of Fig. 3. Fig. 5 is a plan view of the parts shown in Figs. 3 and 4. Fig. 6 is a transverse section on line 6 6 of Fig. 3. Fig. 7 is an inner face view of one of the heads of the rotative casing of the motor. Fig. 8 is a central vertical section thereof. Fig. 9 is a longitudinal vertical section of the valve-casing, taken on line 9 9 of Fig. 10. Fig. 10 is a longitudinal vertical section of said casing, taken on line 10 10 of Fig. 9. Fig. 11 is an end view of the parts constituting one of the sliding plates or pistons, showing the same slightly separated. Fig. 12 is a face view of the same parts similarly separated. Fig. 13 is an inner end view of said parts constituting one of the pistons or sliding plates. Fig. 14 is an inner edge elevation of one of said parts. Fig. 15 is a face view of the piston or plate and its connected shoe. Fig. 16 is an edge elevation of the same parts. Fig. 17 is a detail section taken on a radial plane, showing one of the lateral extensions of the cylinder and the piston or plate therein. Fig. 18 is a transverse section on line 18 18 of Fig. 17. Fig. 19 is a transverse section of the shoe connected with the inner end of the piston. Fig. 20 is an outer face view of the shoe, showing the parts slightly separated to illustrate the construction thereof. Fig. 21 is an end elevation of said shoe. Fig. 22 is a side elevation thereof. Fig. 23 is a side elevation of the reversing-valve body. Fig. 24 is an end view thereof. Fig. 25 is an axial section of the complete valve. Fig. 26 is a section taken on line 26 26 of Fig. 25. Fig. 27 is a side elevation of the complete valve. Fig. 28 is a side elevation of one of the packing-strips for the sliding plate or piston. Fig. 29 is a cross-section taken on line 29 29 of Fig. 28. Fig. 30 is an edge view of the spring which holds the strip shown in Figs. 28 and 29 against said plate or piston.

As shown in said drawings, A indicates the exterior casing of the engine, which is rotatively mounted on a stationary shaft B, which when the motor is used as a hub-motor is adapted to be connected with and forms an extension of the stationary axle. Said shaft is provided inside the casing with an eccentric cylindric part B′, constituting in this instance an abutment against which the steam acts to rotate the casing A and hereinafter termed a "cylinder." If the casing be stationary and the shaft rotative, said eccentric part B′ will constitute the inner rotative member of the motor. Said casing is provided with two heads A′ A^2, which latter have outwardly-extending cylindric flanges or hubs a a', which surround the concentric parts of the shaft at each end of the eccentric cylindric portion thereof and affords bearing-boxes by which the casing is carried on said shaft. Desirably roller-bearings are interposed between the said bearing-boxes and the shaft, said roller-bearing consisting of inner and outer cylindric steel sleeves a^2 b, stationary with the box and shaft, respectively, interposed cylindric rollers a^3, and rings a^4 a^5, which are located at the ends of the rollers and in which said rollers are journaled. Said roller-bearings are confined between flanges a^6 (shown more clearly in Fig. 8) and end plates A^3 A^3 of the boxes. The shaft B passes through the plate at one side of the motor, but extends

only to the other plate, as shown in Fig. 2. Said shaft B is provided on either side of the eccentric cylinder thereof with radial disks or flanges B^2 B^2, the outer edges of which have steam-tight engagement with the cylindric wall of the casing and which constitute the side walls of the interior chamber of the casing. In order to prevent leakage of steam between said flanges and the heads A′ A^2 of the cylinder, packing-rings C are interposed between said flanges and head, as shown more clearly in Figs. 2, 7, and 8. Said rings occupy annular grooves or recesses in the inner faces of the heads and are made oblique or inclined on their peripheries to engage the conical outer walls of said annular grooves or recesses. Each packing-ring is duplex, consisting of two separate annular members which are so disposed with respect to each other that the meeting ends of one member is out of line with the meeting ends of the other member, as shown more clearly in Fig. 7. The packing-rings are held outwardly against their seats in the heads by means of springs C′, which occupy recesses or sockets b^a in the outer faces of the flanges B^2 and act to press said rings outwardly.

D D designate two radially-movable flat plates which in the construction shown constitute pistons. In case the casing of the motor be stationary and the shaft rotative, said plates would constitute abutments. Said plates slide at their outer ends in transverse ways or guide-recesses formed in radial extensions of the motor-casing. Said extensions, as herein shown, consist of integral projecting parts A^4 (shown in Figs. 1, 2, and 7) and hollow U-shaped castings A^5, Figs. 1, 17, and 18, attached to said extensions A^4 and provided with flat side covers or heads A^6, which form the end walls of said guide-recesses for the sliding plates or pistons and which are flush with the inner surfaces of the disks or flanges B^2. In order to prevent the escape of steam past said plates into the guide-recesses, packing strips or blocks *d* are provided, Figs. 1, 18, 28, and 29, which occupy grooves in the inner walls of said guide-recesses and bear against the side faces of the plates. Said packing-strips are forced yieldingly against the plates by means of leaf-springs *d′*, Figs. 18, 28, and 30, interposed between said strips and the walls of the recesses. Said sliding plates are provided at their inner ends with bearing-shoes E, Figs. 2, 15, 16, 20, and 22. Said shoes have oscillatory connection with the inner edges of the plates in such manner as to permit the latter to turn or swing slightly on the plates to maintain the proper accurate relation between the shoes and the eccentric cylinder as the plates move or turn around said cylinder with the shoes in contact therewith. The cylindric wall of the casing is shown as provided with recesses a^7 at the inner ends of the guide-openings for the pistons, Fig. 1, to receive the shoes when the pistons are in their outermost positions. The pivotal connection between the shoes E and plates D is shown as formed by means of longitudinal parti-cylindric heads D′ on the plates, which engage correspondingly-shaped longitudinal recesses, as *e*, in the shoes in the manner shown in Figs. 12, 13, 14, 16, and 21. Said shoes and plates are connected with the stationary shaft in such manner as to insure the proper engagement of the shoes with the eccentric cylinder in all parts of the movement of the casing around the shaft, said connections being such as to positively move the plates in their ways or guides as the part of the casing containing the same moves toward and away from the eccentric cylinder. The construction for effecting this result consists in this instance of annular grooves *b′*, Figs. 1, 2, 3, 5, and 6, formed on the inner faces of the disks or flanges B^2, concentric with the axis of the eccentric cylinder and preferably adjacent to the outer surface of the latter. Said grooves *b′* are engaged by curved lugs *e′*, Figs. 2, 15, 20, and 22, projecting outwardly from the ends of the shoes E. The plates are inserted in their guides or ways before the casing is mounted on the shaft, and in order to afford means for inserting the shoes in the chamber of the casing one of the flanges B^2 is provided with an opening covered by a removable part B^4, as shown in Figs. 3 and 4, said part consisting of a plate which is attached to the flange B^2 by means of screws or the like. When said plate is removed, it affords an opening of sufficient size to permit the shoes to be horizontally inserted into the casing when the casing is turned into the proper position therefor. When said shoes are to be inserted in the casing, the casing is first revolved to bring one of the plates D in line with the opening in the flange or disk B^2, and the shoe is then inserted in the casing, the groove *e* thereof slipping over the parti-cylindric head at the inner end of the adjacent piston or plate. After one of said shoes has been inserted in place in the manner described the casing is revolved to bring the other plate in line with said opening, and the other shoe is thereafter inserted into place in the same manner. Obviously the operation of removing the shoes from the casing is the reverse of that just described. The removable plate B^4 has formed on its inner surface a part of the groove *b′*, engaged by the lugs *e′* of the shoes E, so that when said plate is removed a break is formed in the groove, which permits the lugs *e′* of the shoes to be inserted therein.

The eccentric cylinder does not come into contact with the interior cylindric surface of the casing, and a tight joint is provided between these parts by means of a radially-movable packing-block F, which occupies a longitudinal groove or recess in the cylindric surface of the eccentric cylinder in the manner shown in Figs. 2, 3, and 6 and engages at its outer surface said interior surface of the casing. Said block is capable of sliding radially inwardly and outwardly in said

groove or recess and fits steam-tight against the inner cylindric surface of the casing. The block is supported in said recess by means of studs or pins *f*, projecting outwardly from the ends of the block through radially-arranged slots b^2 in the disks or flanges B^2, Figs. 2, 3, and 4, and provided at their outer ends with rollers *f'*, which travel in annular grooves A^8 in the inner faces of the heads A' and A^2 of the casing, as more clearly shown in Figs. 2, 7, and 8. Said annular grooves A^8 are so disposed with respect to the eccentric cylinder as to hold the bearing-block F projecting outwardly from the recess in the cylinder during almost the entire rotation of the cylinders, as shown in Figs. 3 and 6. Inasmuch, however, as the bearing member projects beyond the periphery of the cylinder, it is necessary in the revolution of the casing about said cylinder to draw the block into the recess twice during each revolution of the casing in order to permit the shoes E to pass over the block. This is accomplished by providing the annular groove A^8 with two inwardly-deflected cam portions A^9 A^9, as clearly shown in Fig. 7, said cam portions being so located with respect to the sliding plates D as to move said block entirely into the recess occupied thereby at the time each shoe reaches the portion of the eccentric cylinder containing said recess. In order to provide for wear of the block, it is made of two parts, embracing a body portion F' and a wearing-plate F^2, joined by bolts F^3, passing outwardly through said body and having screw-threaded engagement with the wearing-plate. Surrounding said bolts and interposed between the wearing-plate and flanges in the holes through which the bolts pass are spiral springs f^3, which act to press said plate outwardly and hold the same in close contact with the interior cylinder-surface of the casing notwithstanding wear between said parts.

The eccentric cylinder B' is provided with inlet and outlet ports b^3 b^4, Figs. 1 and 6, which open through the surface thereof at either side of the bearing-block F. Said ports communicate with longitudinal passages b^5 b^6, Figs. 2, 3, 5, and 9, extending through the body of the cylinder and the shaft B toward one end of the latter. At points outside the flange *a'* on the rotating casing said passages are connected with radial openings b^7 b^8 in the shaft, as shown in full lines in Fig. 9 and in dotted lines in Fig. 5, which radial openings open into the cylindric surface of the shaft B.

G, Figs. 1, 9, and 10, designates a casing non-rotatively secured to the shaft B around the part thereof in which the openings b^7 b^8 are located. Said casing is provided with a cylindric seat for a rotative valve (indicated as a whole by the letter I) and with lateral passages *g g'*, leading from the ports in the valve-seats to the radial passages b^7 b^8 in the shaft. Said casing G is also provided with a centrally-arranged exhaust-passage g^2, leading from a port-opening into the seat engaged by the valve I in said casing and connected with an exhaust pipe or passage I^a. The casing G is provided with an inlet-passage g^3, adapted to be connected with an inlet-pipe leading from any suitable source supplying the motive fluid, and said passage communicates with a port which opens the valve-seat engaged by the valve I.

The details of the valve are shown in Figs. 23 to 27, inclusive, and are made as follows: Said valve consists of a cylindric body I', provided on each side of its center with parallel depressions or recesses I^2 and which extend in a direction transverse to the axis of the body. Said body is surrounded by a split spring-ring I^3, which is confined between a radial annular flange *i* at one end of the body and a plate *i'*, detachably connected with the other end of the body and overlapping one margin of said ring. Said ring is provided with four holes or openings which are located in alinement with the ends of recesses or depressions I^2, said recesses in the block and holes in the ring constituting two through-ports I^4, as indicated in Fig. 27. The ring is held from turning on the body by means of a key I^5, fastened to the ring, Figs. 25 and 26, which enters a groove i^2, Fig. 24, in the body disposed parallel with respect to the axis of said body. Means are provided for compensating for the wear on the exterior surface of the ring and valve-seat, whereby a steam-tight joint is maintained between the valve and its seat, said means being constructed to expand the ring upon wear thereof and hold the same in firm contact with the valve-seat. This construction is shown more clearly in Figs. 25 and 26 and consists of a radially-movable block I^6, which occupies a groove or recess in the periphery of the cylindric body I' and parallel with the axis of said body. Said block is held yieldingly against the ring by means of springs I^7 I^7, which occupy radial sockets in the body and press outwardly against the inner surface of said movable block. The valve is rotatively mounted in the casing G by means of a stud i^3 thereon, Figs. 10, 23, and 25, which enters a socket in the side wall of the casing, and a stem i^4, which has screw-threaded engagement with the side of the valve remote from the stud i^3 and, as herein shown, is provided with a hand-lever i^5, by which the valve may be rotated. The stem i^4 of the valve passes through a removable plate I^8, attached to the casing-wall by means of screw-studs or the like, and the removal of which permits the insertion or removal of the valve. Said plate is provided with a central stuffing-box I^9, through which the stem passes and whereby a steam-tight joint is provided.

By an inspection of Fig. 9 with reference to Fig. 1 it will be observed that when the valve is turned into the position shown in Fig. 9 live steam may pass through the left-

hand port or opening I^4 of the valve through the connected passages $g\ b^7\ b^5\ b^3$ into the left side of the casing, as shown in Fig. 1, the direction of the steam being indicated by the arrows. At this time the right-hand passage g' of the casing and therefore the connected passages b^8, b^6, and b^4 are cut off from the steam-inlet, but are in communication with the exhaust-port through one of the ports I^4 of the valve. Steam therefore enters the left-hand side of the cylinder until the shoe E covers the inlet-port b^3, after which the steam acts expansively until the upper shoe (shown in Fig. 1) passes the port b^4. During this time steam is being exhausted through the passage b^4 and its connected passages. After the upper shoe (shown in Fig. 1) passes the passage b^4 the steam at the left thereof begins to exhaust through the passage b^4. If it be desired to reverse the engine, the valve I is rotated so as to bring the port, which is shown in Fig. 9 as connecting the inlet with the passage g, in position for establishing communication between said passage g and the exhaust-passage and also to afford communication through the other port of the valve between the inlet and the passage g'. The steam-passages $b^3\ b^4$ are provided with branch passages $b^9\ b^{10}$, each of which open upon the face of the cylinder a distance from the opening of its connected main passage greater than the thickness of the bearing-shoes E. This construction prevents the shoes from entirely closing the steam-inlet passage, as might occur should the branch passages be omitted and one of the shoes stop directly over the inlet-passage. In the construction shown the shoe is not of sufficient width to cover the inlet-passage and its branch, whereby if the shoe stops over the main steam-inlet passage steam would enter the casing behind the piston through the connected branch passage and rotate the casing.

It will be obvious that by turning the valve a desired distance one way or the other from the position shown in Fig. 9 the volume of steam admitted to the engine, and therefore the speed of the engine, may be varied and that by turning the imperforate part of the valve opposite to the inlet and exhaust passages the steam may be cut off entirely from the engine. The valve I therefore serves as a cut-off, regulating, and reversing valve and is so constructed that a steam-tight joint between the valve and its seat is assured notwithstanding wear of said parts.

In order to maintain at all times a steam-tight joint between the side edges of the plates D and the sides of the guide-passages and flanges or disks B^2, a construction is provided which is shown in detail in Figs. 11 to 18, the same being made as follows: Each of said plates is divided longitudinally into two sides or halves $D^2\ D^3$, which are connected at their meeting edges by means of a sliding and steam-tight connection consisting principally of a tongue d^4 on the part D^3 and a groove d' in the other part adapted to receive said tongue. Coiled springs d^3 are inserted in recesses or sockets in the part D^2, so as to act upon the other part to throw outwardly or separate the two parts of the plate, and thus hold their outer edges pressed against the inner faces of the side walls of the guides and the disks or the flanges B^2. The springs engage enlargements d^4 on the part D^3, which project slightly in advance of the tongue, as shown more clearly in Figs. 11, 12, and 14. The lateral sides of the principal parts of said enlargements are flush with the faces of the plates; but at the extreme ends of said enlargements rabbets d^5 are formed on the side faces thereof, which permit said outer ends of the enlargements to enter the recesses or sockets which contain the springs d^3. In this manner steam is prevented from escaping along the groove d', and said rabbets d^5 are made of sufficient width to insure the same being maintained in contact with the walls of the spring-sockets in the maximum expansion of the plate, thereby preventing steam escaping through the piston at these points.

The shoe E, connected with each plate D, is also made longitudinally expansible, so that it then may be held in contact with the disks or flanges B^2 in the same manner as the body of the plate. The construction for this purpose is shown in Figs. 19 to 22, inclusive. As shown therein, said shoe is made of two parts $E'\ E^2$. The part E' is provided between the longitudinal groove e and its contact-face with a recess or socket e^2, as indicated in dotted lines in Fig. 22, and the part E^2 is provided with a stud or projection e^3, which enters said socket. Spiral springs e^4, one on each side of the projection e^3, are placed in recesses in the part E^2 and are adapted to bear against the bottom walls of corresponding recesses in the part E', as clearly indicated in Fig. 20, said springs tending to throw the parts away from each other and hold their ends in contact with the flanges or disks B^2.

The extensions A^5 are provided at their outer ends with air-discharge pipes O, which permit air to escape therefrom when the plates move outwardly and also prevent the creation of a vacuum when the plates move inwardly.

The arrangement of the branch passages b^9 b^{10} with respect to the air-passages permit the escape of water of condensation from the casing, as the outer ends thereof are located closer to the interior of the casing than the main passages $b^3\ b^4$.

The motor herein shown is especially applicable for use as a center-wheel or hub motor and may be readily applied to vehicle-wheels in the construction of automobiles as well as to hubs of driving-pulleys for transmitting power. It will be obvious, however, that the operation of the said parts—to wit, the casing and the shaft—may be reversed, the shaft being made to rotate while the casing remains stationary. In such construction the parts herein termed the "cylinder"

and which constitute the abutment would become the main rotary part or piston of the engine, while the plates D would become the abutments against which the steam would act to drive the engine. Appropriate terms are therefore employed in designating the several operative parts of the motor which do not limit the same to the particular construction herein shown.

It is obvious that many changes may be made in the details of construction without departing from the spirit of the invention, and I do not wish to be limited to such details except as hereinafter made the subject of specific claims.

I claim as my invention—

1. A rotary motor comprising an exterior casing having a cylindric inner surface, an eccentric cylinder therein, said eccentric cylinder and casing having rotative movement one with respect to the other, and the cylinder being provided at its ends with circular disks or flanges formed at their margins to provide steam-tight joints with the cylindric inner surface of the casing, radially-sliding plates in the casing, shoes having oscillatory connection with the inner ends of said plates and bearing against the cylinder and lugs on the shoes adapted to engage circular grooves formed on the inner faces of said disks or flanges.

2. A rotary motor comprising an exterior casing having a cylindric inner surface, an eccentric cylinder therein, said eccentric cylinder and casing having rotative movement one with respect to the other, radially-sliding plates in the casing having parts engaging the eccentric surface of the cylinder, a radially-movable bearing-block occupying a longitudinal recess in the periphery of said cylinder and bearing at its outer face against the cylindric interior surface of the casing, said bearing-block being provided with projecting parts which enter guide-grooves in the casing and said grooves having cam-surfaces which are located to retract the block in its grooves when the plates pass thereover.

3. A rotary motor comprising an exterior casing having a cylindric inner surface, an eccentric cylinder therein, said eccentric cylinder and casing having rotative movement one with respect to the other, radially-sliding plates mounted in the casing and having parts engaging the surface of the eccentric cylinder, supply and exhaust passages leading through said cylinder and opening into the casing, a radially-movable bearing-block occupying a longitudinal groove in the periphery of said cylinder and bearing against the inner cylindric surface of the casing, and means for retracting said block into its recess to permit the inner ends of the plates to pass thereover.

4. A rotary motor comprising an exterior casing having a clyindric interior surface, an eccentric cylinder therein, said eccentric cylinder and casing havingrotative movement one with respect to the other, radially-sliding plates mounted in the casing and having parts engaging the surface of the eccentric cylinder, supply and exhaust passages leading through said eccentric cylinder and opening into the interior of the casing, a radially-movable bearing-block occupying a longitudinal recess in the periphery of the cylinder, and projecting parts at the ends of said bearing member engaging curved guide-grooves in the casing.

5. A rotary motor comprising an exterior casing having a cylindric interior surface, an eccentric cylinder therein, said eccentric cylinder and casing having rotative movement one with respect to the other, circular disks or flanges at the ends of the cylinders formed at their margins to provide steam-tight joints with the interior cylindric surface of the casing, radially-sliding plates mounted in the casing and having parts engaging the surface of the eccentric cylinder, supply and exhaust passages leading through said eccentric cylinder and opening into the interior of the casing, interlocking connections between said sliding plates and said disks or flanges acting to hold the plates in their proper relation with respect to the cylinder and a bearing-block occupying a longitudinal recess in said cylinder and bearing against the cylindric interior surface of the casing, said bearing-block being provided with extensions which pass through openings in the disks or flanges and engage curved guide-grooves in the casing, and said grooves being provided with cam portions which act to withdraw the bearing-block into its recess to permit the plates to pass over the same.

6. A rotary motor comprising an exterior casing having an interior cylindric surface, an eccentric cylinder therein, said cylinder and casing having rotative movement one with respect to the other, radially-sliding plates in the casing, shoes pivotally connected with the inner ends of said plates and engaging the surface of the eccentric cylinder, disks or flanges at the ends of said cylinder having interlocking guiding engagement with the ends of said shoes, one of said disks or flanges being provided with a removable part, the removal of which permits said shoes to be inserted into or removed from the casing.

7. A rotary motor comprising an exterior casing having an interior cylindric surface, an eccentric cylinder therein, said cylinder and casing having rotative movement one with respect to the other, radially-sliding plates mounted in said casing, shoes pivotally connected with the inner ends of said plates and engaging the surface of the eccentric cylinder, disks or flanges at the ends of said cylinder provided with curved guide-grooves which are engaged by lugs projecting from the ends of said shoes, one of said disks or flanges being provided with an opening covered by a plate, said opening being located to permit the removal of said shoes or insertion thereof in the casing, and said plate containing part

of the guide-groove of said disk or flange engaged by the lugs of the shoes.

8. A rotary motor comprising an exterior casing having a cylindric interior surface, an eccentric cylinder therein, said cylinder and casing having rotative movement one with respect to the other and the cylinder being provided at its ends with annular disks or flanges which are formed to provide at their margins steam-tight joints with the cylindric inner surface of the casing, removable heads for said casing located outside of said disks and inner and outer split packing-rings interposed between said heads and disks, the slits in the packing-rings being staggered with relation to each other, and said packing-rings being provided with inclined margins which engage conical recesses or seats in the head formed to receive the same.

9. A rotary motor comprising an exterior casing having a cylindric interior surface, an eccentric cylinder therein, said cylinder and casing having rotative movement one with respect to the other and the cylinder being provided at its ends with annular disks or flanges which are formed to provide at their margins steam-tight joints with the cylindric inner surface of the casing, removable heads for said casing located outside of said disks, and inner and outer rings interposed between said heads and disks, the slits in said rings being staggered with respect to each other, said packing-rings being provided with inclined margins which engage conical recesses or seats in the head formed to receive the same, and springs interposed between said disks and said rings to hold the rings against their conical seats.

10. A rotary motor comprising an exterior casing having a cylindric interior surface, an eccentric cylinder therein, said cylinder and casing having rotative movement one with respect to the other, radially-sliding plates mounted in the casing and having parts engaging the surface of the eccentric cylinder, supply and exhaust passages leading through said eccentric cylinder and opening into the interior of the casing, said sliding plates comprising two laterally-separable parts provided at their meeting edges, one with a tongue and the other with a groove to receive the tongue, said tongue member being provided with enlargements, the outer ends of which enter notches in the grooved member, and springs in said notches which bear outwardly against said enlargements on the tongue member.

11. A rotary motor comprising an eccentrically-disposed cylinder, concentrically-disposed flanges at the opposite ends of said cylinder, a casing inclosing the space around the cylinder and between the flanges and radially-movable plates having at their inner ends parts engaging the outer surface of said cylinder and having also interlocking guiding engagement with said flanges.

12. A rotary motor comprising an eccentrically-disposed cylinder, concentrically-disposed flanges at the opposite ends of said cylinder, a casing inclosing the space around said cylinder and between the flanges radially-movable plates having at their inner ends parts engaging the outer surface of said cylinder, a radially-movable bearing-block occupying a longitudinal groove in said cylinder and bearing against the inner cylindric surface of said casing and means for retracting said block into its recess to permit the plates to pass thereover.

13. A rotary motor comprising an axle or spindle having thereon two concentrically-disposed flanges, an eccentrically-disposed cylinder between said flanges, a casing, comprising an annular part, inclosing the space around the cylinder between said flanges and having slots or openings therethrough, hollow caps or extensions secured to said annular part or casing over said slots, heads secured to said casing and engaging said axle outside of said flanges, plates radially movable in said slots and hollow caps and having parts bearing against said cylinder, and transverse packing-strips occupying grooves in said extensions and bearing yieldingly against the faces of said plates.

In testimony that I claim the foregoing as my invention I affix my signature, in presence of two witnesses, this 19th day of June, A. D. 1901.

BASIL V. SZABÓ.

Witnesses:
WILLIAM L. HALL,
GERTRUDE BRYCE.