

No. 616,724.

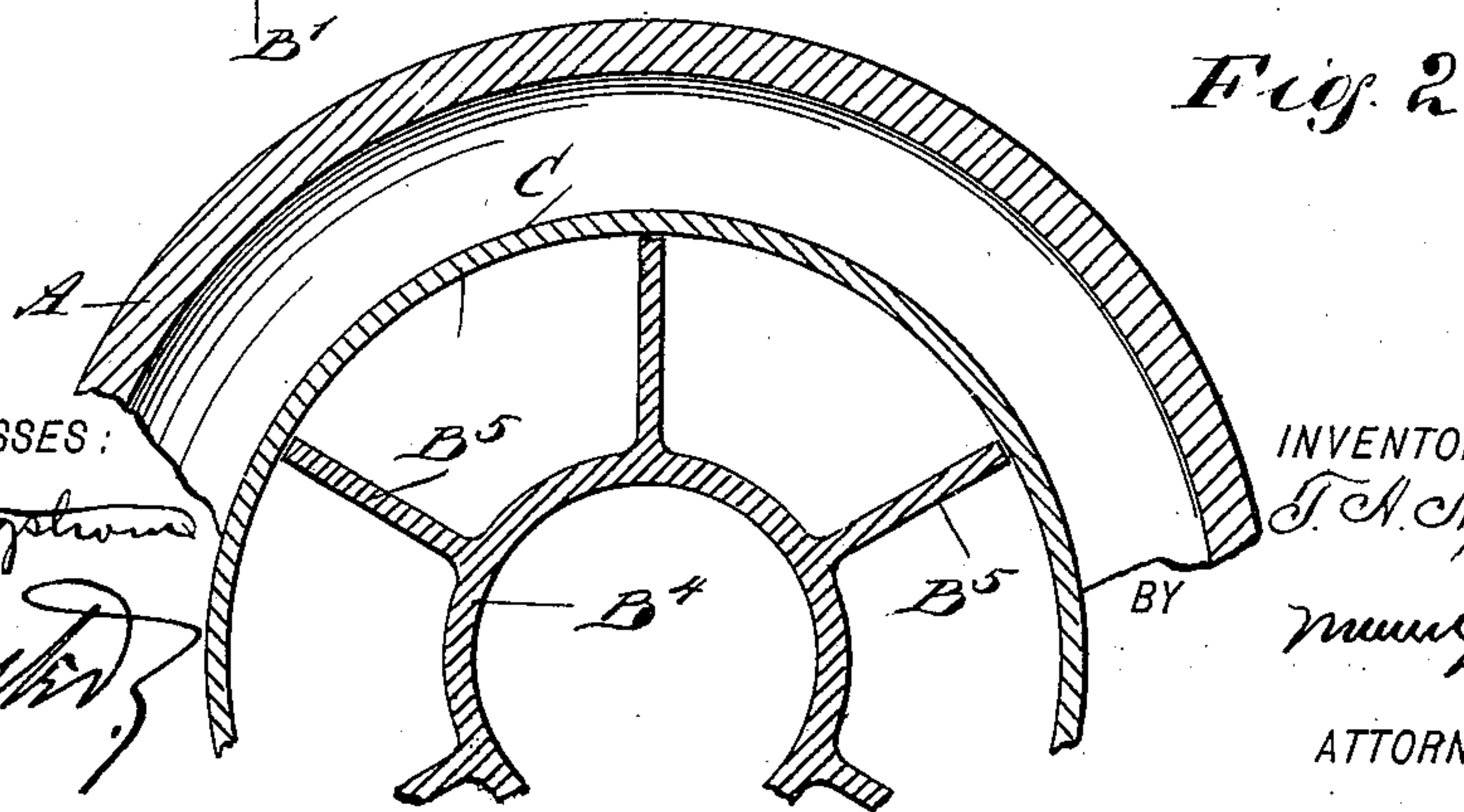
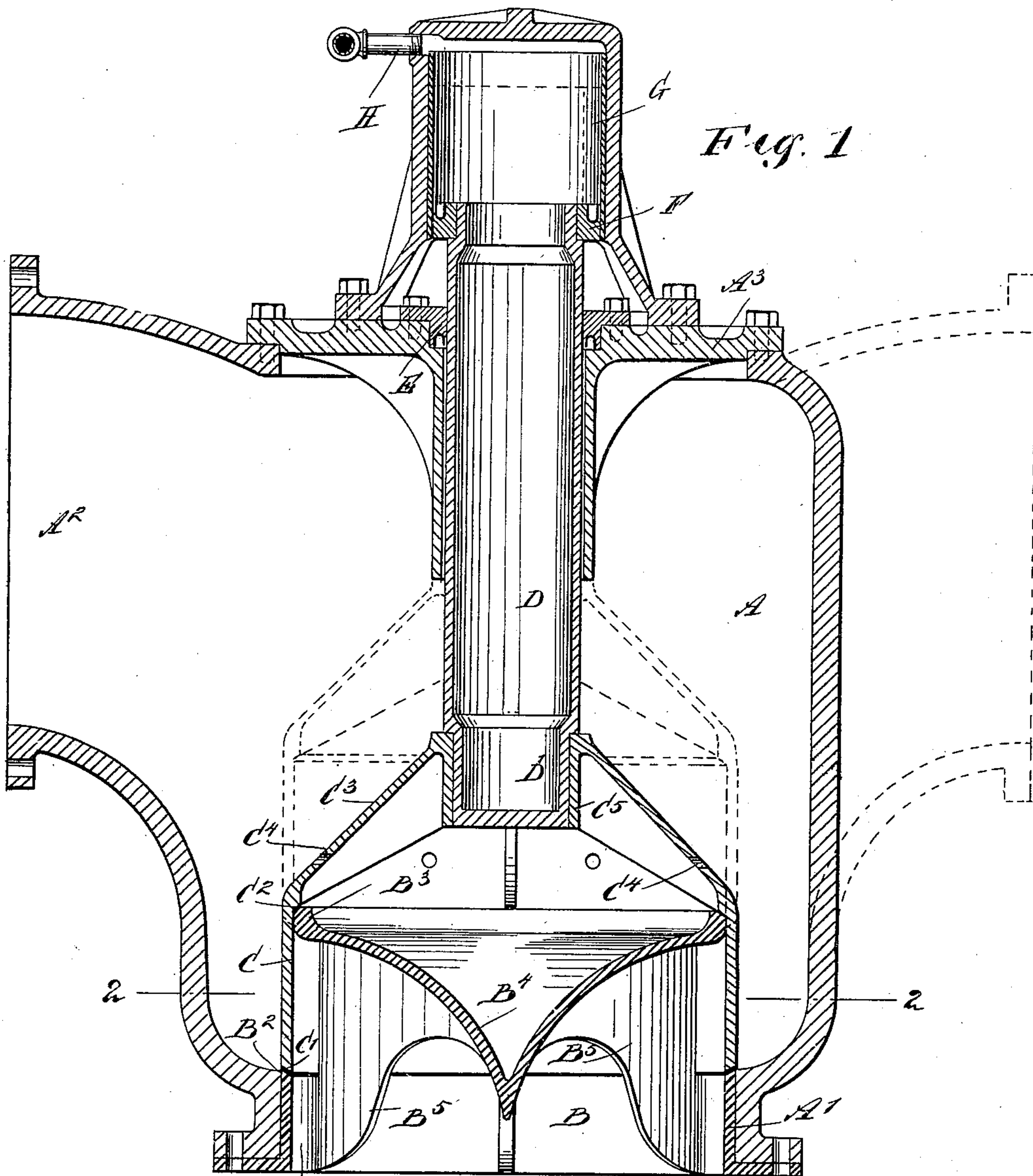
Patented Dec. 27, 1898.

T. A. NOBLE.
CYLINDRICAL BALANCED GATE VALVE.

(Application filed Apr. 27, 1897.)

(No Model.)

2 Sheets—Sheet 1.



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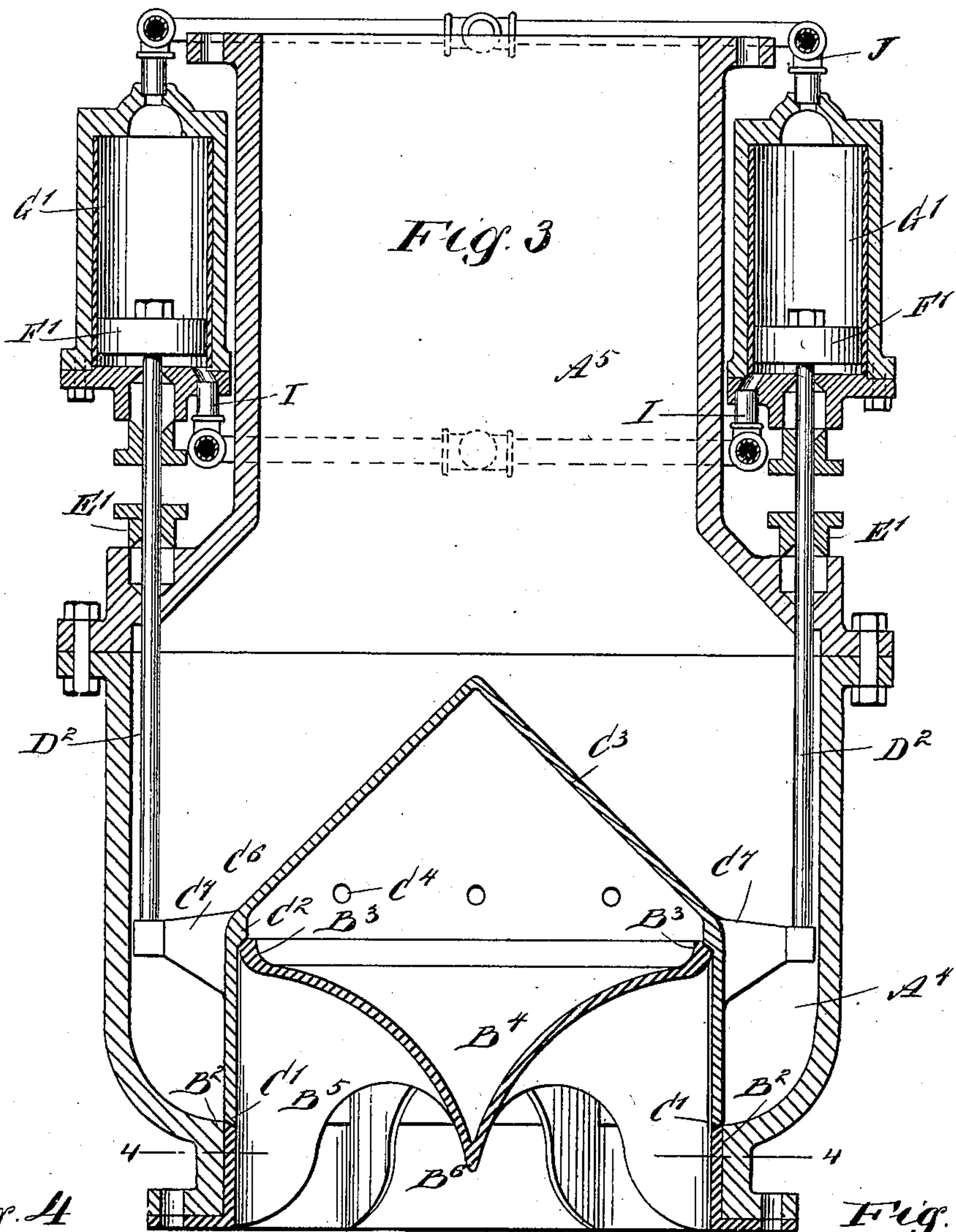
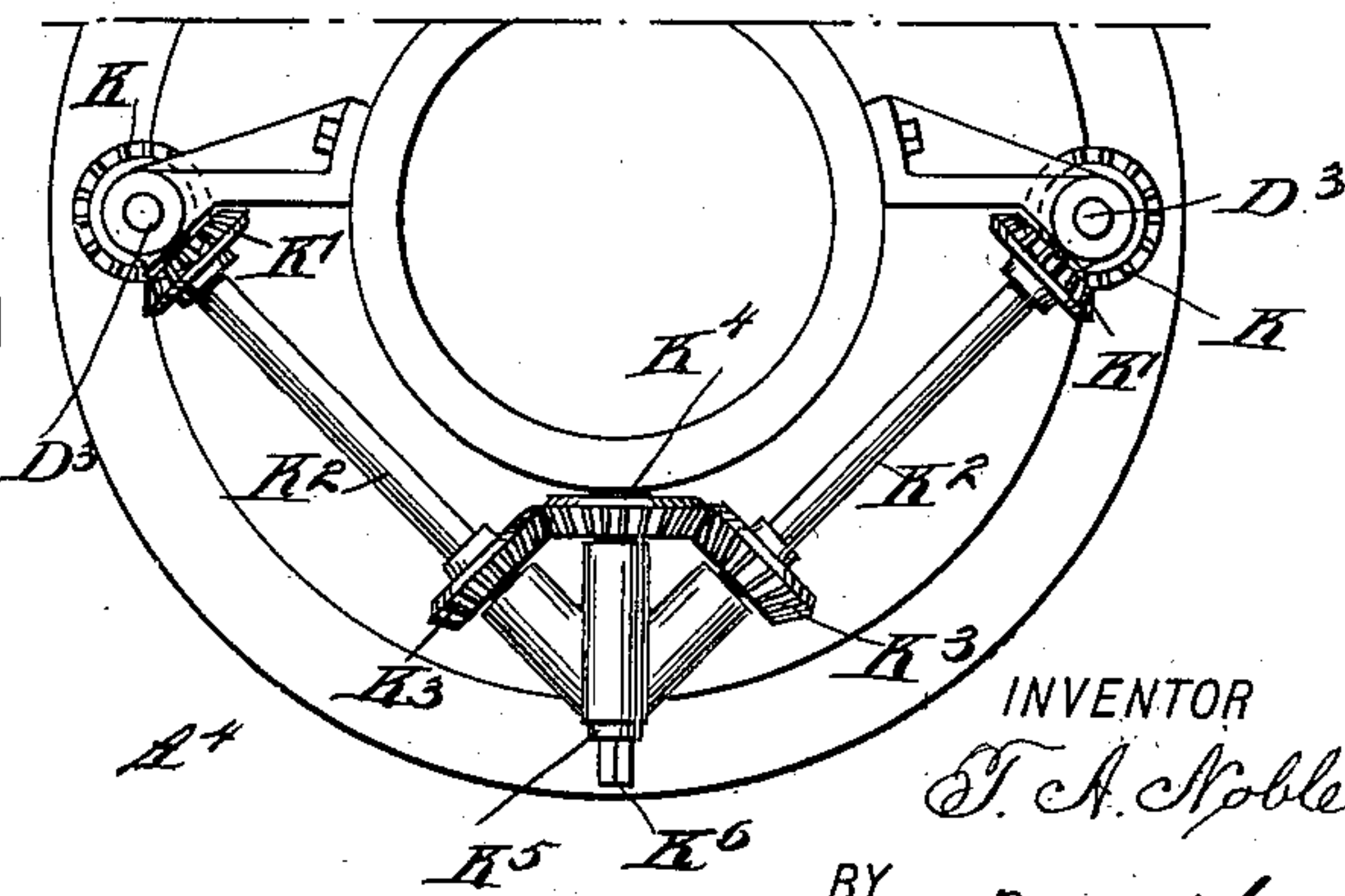
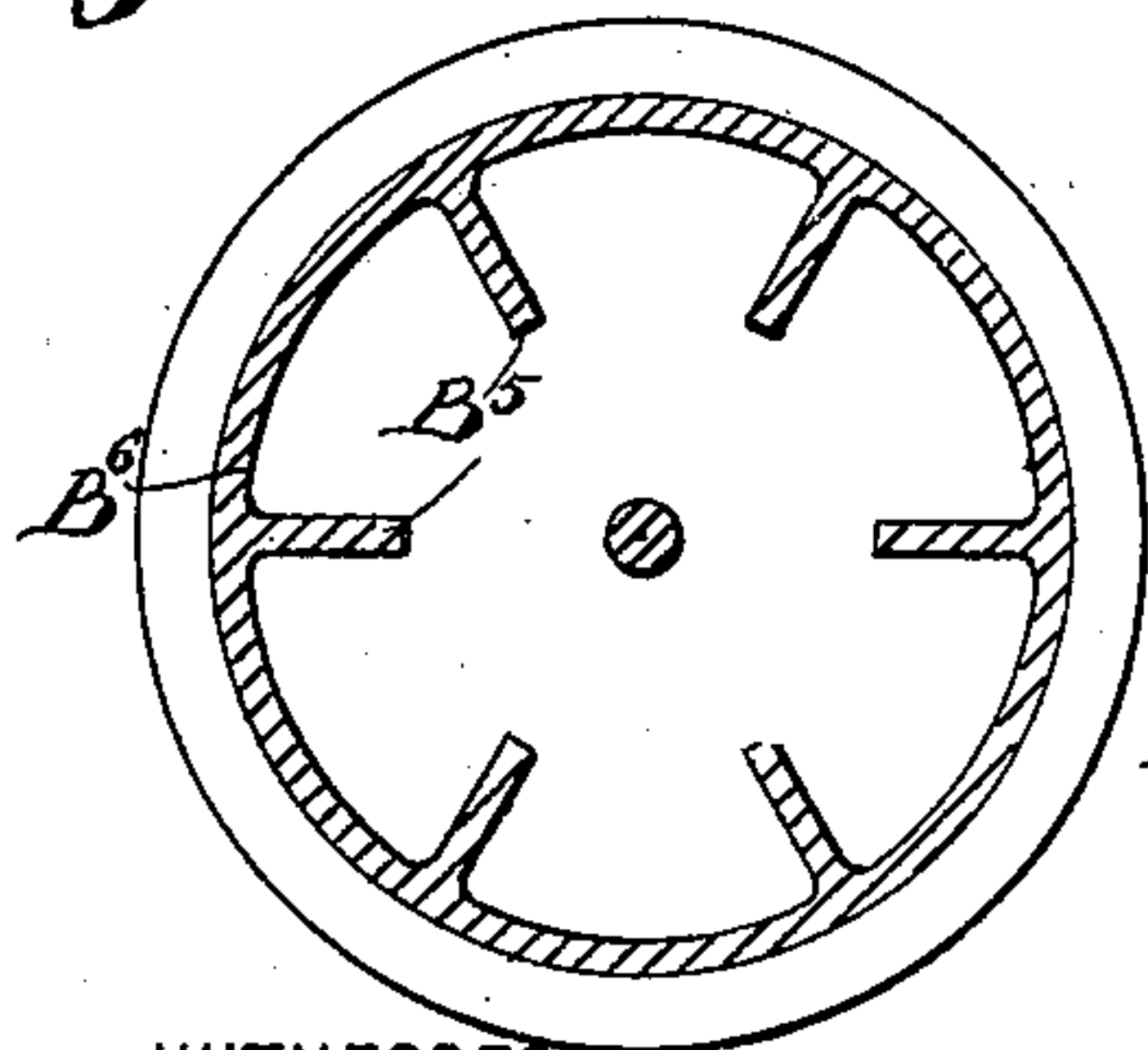


Fig. 4

Fig. 5



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UNITED STATES PATENT OFFICE.

THERON A. NOBLE, OF SEATTLE, WASHINGTON.

CYLINDRICAL BALANCED GATE-VALVE.

SPECIFICATION forming part of Letters Patent No. 616,724, dated December 27, 1898.

Application filed April 27, 1897. Serial No. 634,092. (No model.)

To all whom it may concern:

Be it known that I, THERON A. NOBLE, of Seattle, in the county of King and State of Washington, have invented a new and Improved Cylindrical Balanced Gate-Valve, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved cylindrical balanced gate-valve which is simple and durable in construction and arranged to form an uninterrupted passage for the water when the valve is opened, the valve being perfectly balanced, so as to operate with ease under any pressure.

The invention consists of certain parts and details and combinations of the same, as will be fully described hereinafter and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a side elevation of the improvement. Fig. 2 is a sectional plan view of the same on the line 2 2 of Fig. 1. Fig. 3 is a sectional side elevation of the improvement, showing a modified form and means for opening and closing the valve. Fig. 4 is a reduced sectional plan view of part of the same on the line 4 4 of Fig. 3, and Fig. 5 is a plan view of a modified form of mechanism for raising and lowering the gate by hand-power.

The valve-casing A, as illustrated in Figs. 1 and 2, is made cylindrical and is provided at its reduced inlet end A' with a valve-seat B, bolted or otherwise fastened to the said inlet A'. The valve-casing A is also provided with a reduced outlet A², extending from the side of the casing either to the right or left, as indicated in full and dotted lines in Fig. 1. The valve-seat B is formed with the cylindrical inlet B', fitting into the inlet A', and formed at its upper edge with an annular valve-seat B², preferably beveled, as shown, and adapted to be engaged by the correspondingly-shaped valve edge C' of the cylindrical valve-gate C, extending within the casing A in such a manner as to be completely free to move upward and downward in the casing without coming in contact with the walls thereof. On the upper end of this valve-gate C is formed an internal beveled valve-seat C²,

engaging the correspondingly-shaped annular seat B³, formed on the base end of an inverted cone B⁴, supported on radial ribs B⁵, extending from the inlet B' and integral with the same and the cone B⁴. Now by the arrangement described the valve-gate C when in a closed position is seated on the valve-seats B² and B³, of which one engages the lower edge of the valve-gate and the other an internal annular seat located a suitable distance above the seat B². Furthermore, the ribs B⁵ extend with their outer edges upwardly into the casing A, so as to engage the inner surface of the cylindrical valve-gate C to form a guide for the latter in its up-and-down movement.

The top edge of the cylindrical valve-gate C is provided with a dome C³, having apertures C⁴ to permit water to pass on both sides of the dome, and in the apex end of the dome is formed a socket C⁵, in which is secured the lower end D' of the valve-stem D, made hollow and fitted to slide in a suitable stuffing-box E, attached to the cover A³ of the valve-casing A. On the upper end of the stem D is secured a piston F, fitting into a cylinder G, open at its lower end and connected at its upper end by a pipe H with a suitable source of pressure-supply, the said pipe being provided with a three-way valve (not shown) for connecting the pipe with the pressure-supply or with the open air. Now when the valve-gate C is open and it is desired to close the same the said three-way valve is shifted to connect the supply with the cylinder G to allow water under pressure to pass into the cylinder and act on the piston F therein to force the piston downward, with the valve-gate C, to its seats. The pressure in the cylinder G is the same as the pressure in the valve, and the area of the cylinder being larger than the area of the plunger D it is evident that the piston, stem D, and gate C are forced down until the valve is closed. When it is desired to open the main valve, the three-way valve in the pipe H is turned to cut off the supply and to connect the pipe with the outlet. The pressure in the cylinder G is now the same as the pressure of the atmosphere, and the pressure against the plunger D forces the water out of the cylinder G, which in moving upward in the cylinder

moves the valve-gate C into an open position. When the valve-gate C is closed, the seats on the gate are pushed against the valve-seats B² B³, thus forming a water-tight joint at each end of the valve-gate C. As the latter is cylindrical and as the two seats forming the joints are of the same size, or nearly so, all pressure against the faces of the sliding valve-gate C when the latter is closed is balanced. Thus no more power is required to open the valve than that required to overcome the friction against the sliding surfaces. The hollow valve-stem or plunger D, as shown in Fig. 1, is of considerable area, so that the pressure on the plunger will readily open the valve when the cylinder is connected with the atmosphere.

The valve-gate C, Fig. 1, may be connected with a solid valve-stem extending through a stuffing-box at E, with a thread cut on its outer edge for engaging in a hand-wheel or by other suitable means for operating said valve-gate C by hand-power instead of by hydraulic power, as shown.

In the arrangement shown in Fig. 3 the valve-gate C⁶ is provided with lugs C⁷ within the casing A⁴, and on the said lugs C⁷ are secured the valve-stems D², fitted to slide in stuffing-boxes E', held externally on the outlet A⁵ of the casing. The upper ends of the valve-stems D² are connected with pistons F', fitted to slide in cylinders G', connected at the bottom and top with pressure-supply pipes I and J for forcing the pistons F' upward or downward in the cylinders to open and close the gate-valve C by hydraulic power. The valve-seat B⁶ is the same as described relative to Fig. 1, and the valve-gate C⁶ is similar to the valve-gate C, previously mentioned, so that further description of the said parts is not deemed necessary.

As shown in Fig. 5, a hand-power mechanism may be employed for raising and lowering the valve-gate, and for this purpose I provide the outer ends of the valve-stems D³ with beveled gear-wheels K in mesh with beveled gear-wheels K', secured on the shafts K², standing at right angles one to the other and carrying gear-wheels K³ in mesh with the beveled gear-wheel K⁴, secured on a shaft K⁵, formed with a polygonal offset or end K⁶ for applying a crank-arm or other tool to turn the shaft K⁵, so as to impart a simultaneous turning motion to the shafts K² and the stems D³, provided at their outer ends with the beveled gear-wheels K, previously mentioned. Thus by turning the shaft K⁵ in either direction the valve-gate can be opened or closed.

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

1. A device of the class described, comprising a cylindrical casing having a reduced inlet at its lower end, a valve-seat having a cylindrical inlet portion fitting within the inlet end of the casing and formed at its lower end with a flange by which it is secured to the valve-casing, the said valve-seat extending directly upward into the casing and formed with two annular valve-seats, a cylindrical gate-valve adapted to be seated on the said valve-seats and located directly above and in alinement with the inlet-opening of the valve-casing, and means for raising and lowering said valve, substantially as shown and described.

2. A device of the class described, comprising a valve-casing having a reduced inlet and outlet, a valve-seat having a cylindrical inlet portion fitted within the inlet of the casing and having a flange adapted to be secured to the valve-casing, the said cylindrical inlet portion being formed at its upper edge with an annular beveled seat, radial ribs extending from the cylindrical inlet, a top carried by the ribs and formed with an annular beveled seat on its upper outer edge, a cylindrical gate-valve arranged within the casing and having guided movement on said ribs, the lower edge of said gate-valve being shaped to fit the beveled edge of the seat-inlet, the said gate-valve having an upper annular beveled seat on its internal surface for engaging the seat on the said top, and means for raising and lowering said gate-valve, substantially as shown and described.

3. The combination with a valve-casing provided with a valve-seat, of a cylinder open at one end, a piston adapted to reciprocate in said cylinder, a plunger having considerable area, and connected at one end with said piston and passing through a stuffing-box into the valve-casing the area of the said cylinder being larger than the area of the plunger, a cylindrical gate-valve connected with the said plunger and arranged to be seated on the said valve-seat, the said valve being so constructed that the pressure against its faces when closed is balanced, and a pipe adapted to connect the closed end of the cylinder with either the pressure or the atmosphere, whereby when the closed end of the cylinder is in communication with the atmosphere, the pressure of the supply against the plunger will open the valve and when the closed end of the cylinder is connected with the supply the pressure in the cylinder acting on the piston will seat the valve, substantially as set forth.

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Witnesses:

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