No. 756,431. PATENTED APR. 5, 1904.

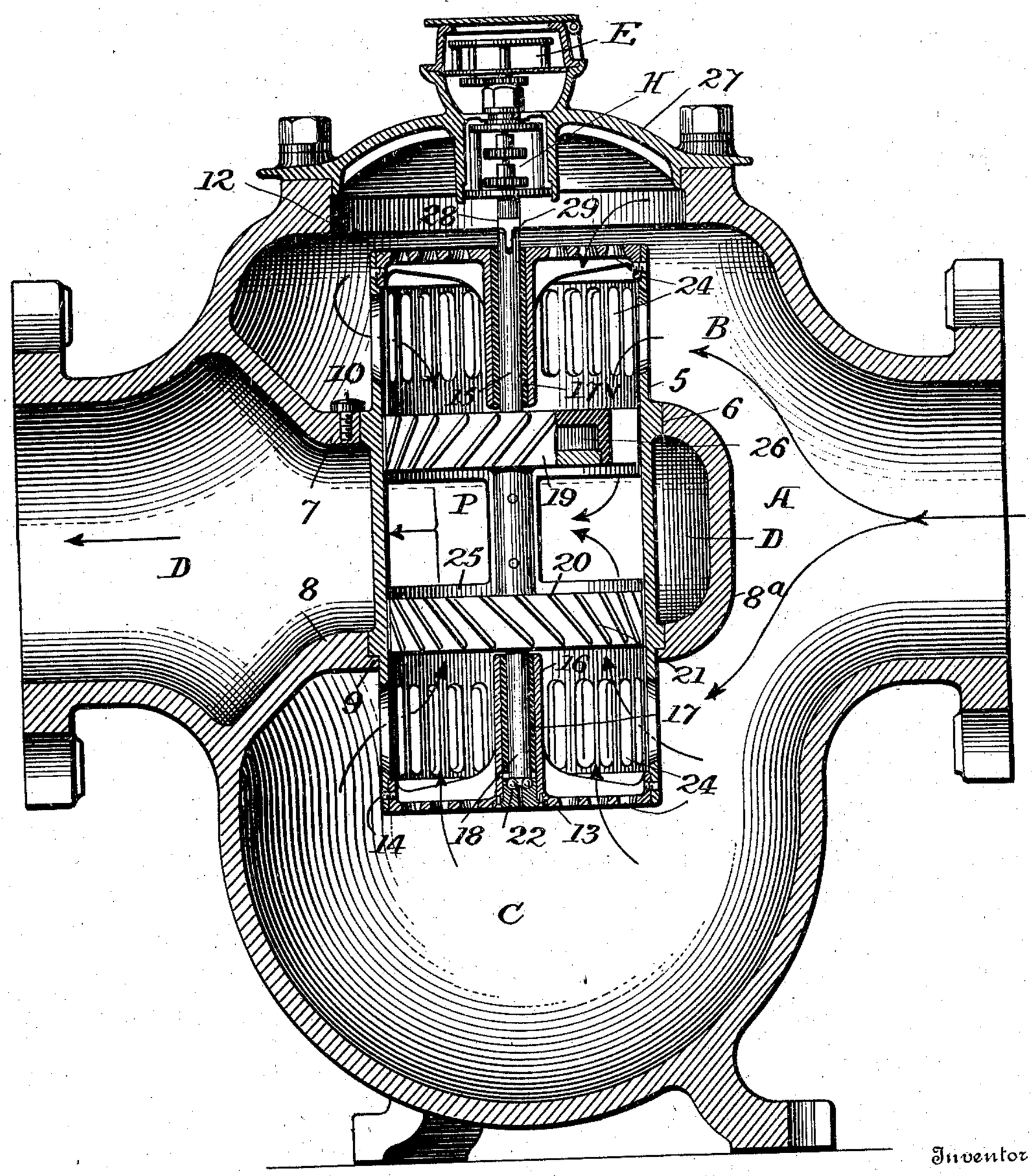
J. THOMSON.

WATER METER.

APPLICATION FILED MAY 13, 1902.

NO MODEL. 4 SHEETS—SHEET 1.

Fig. 1.



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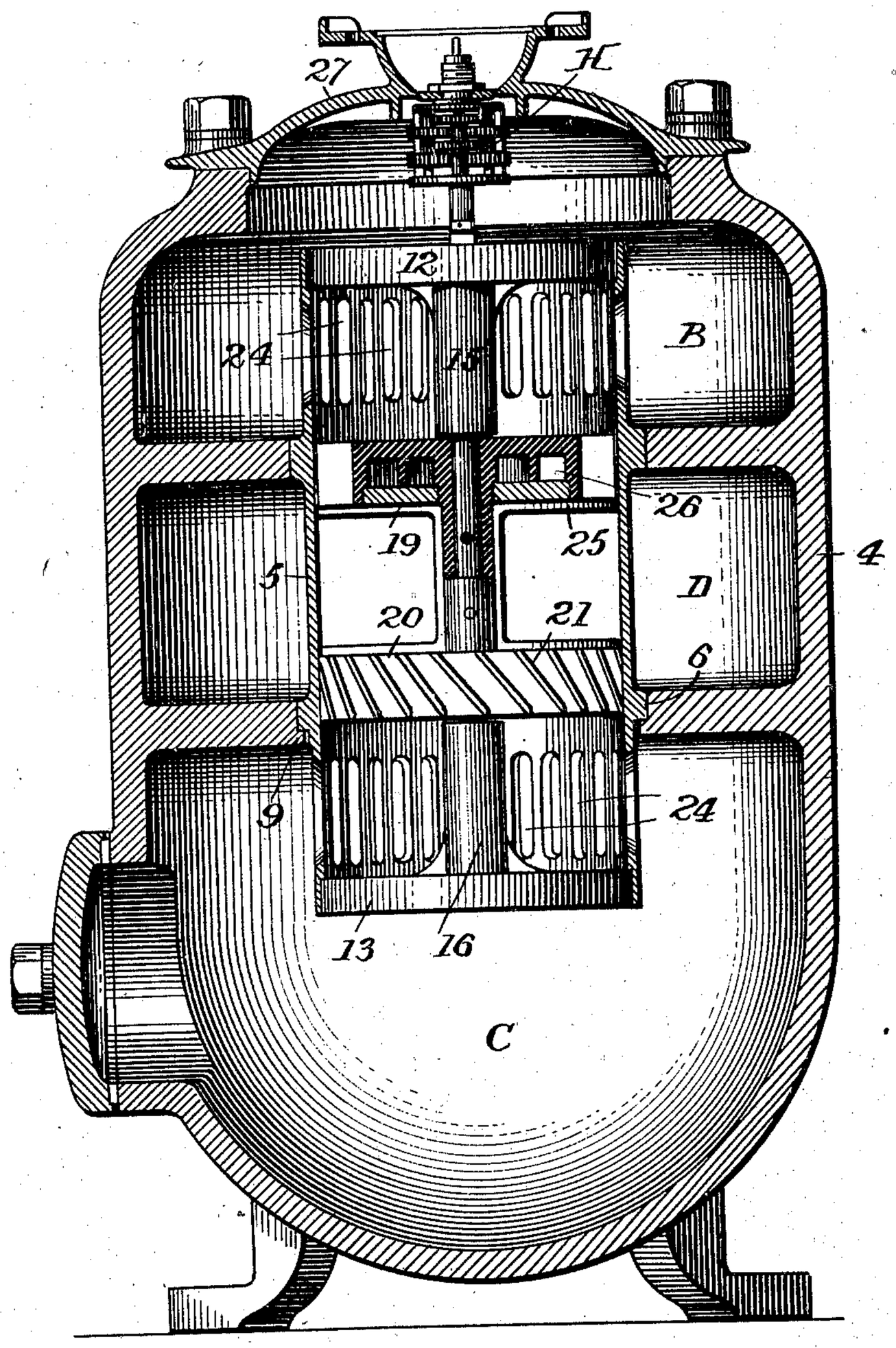
NO MODEL. 4 SHEETS—SHEET 2.

Fig. 2



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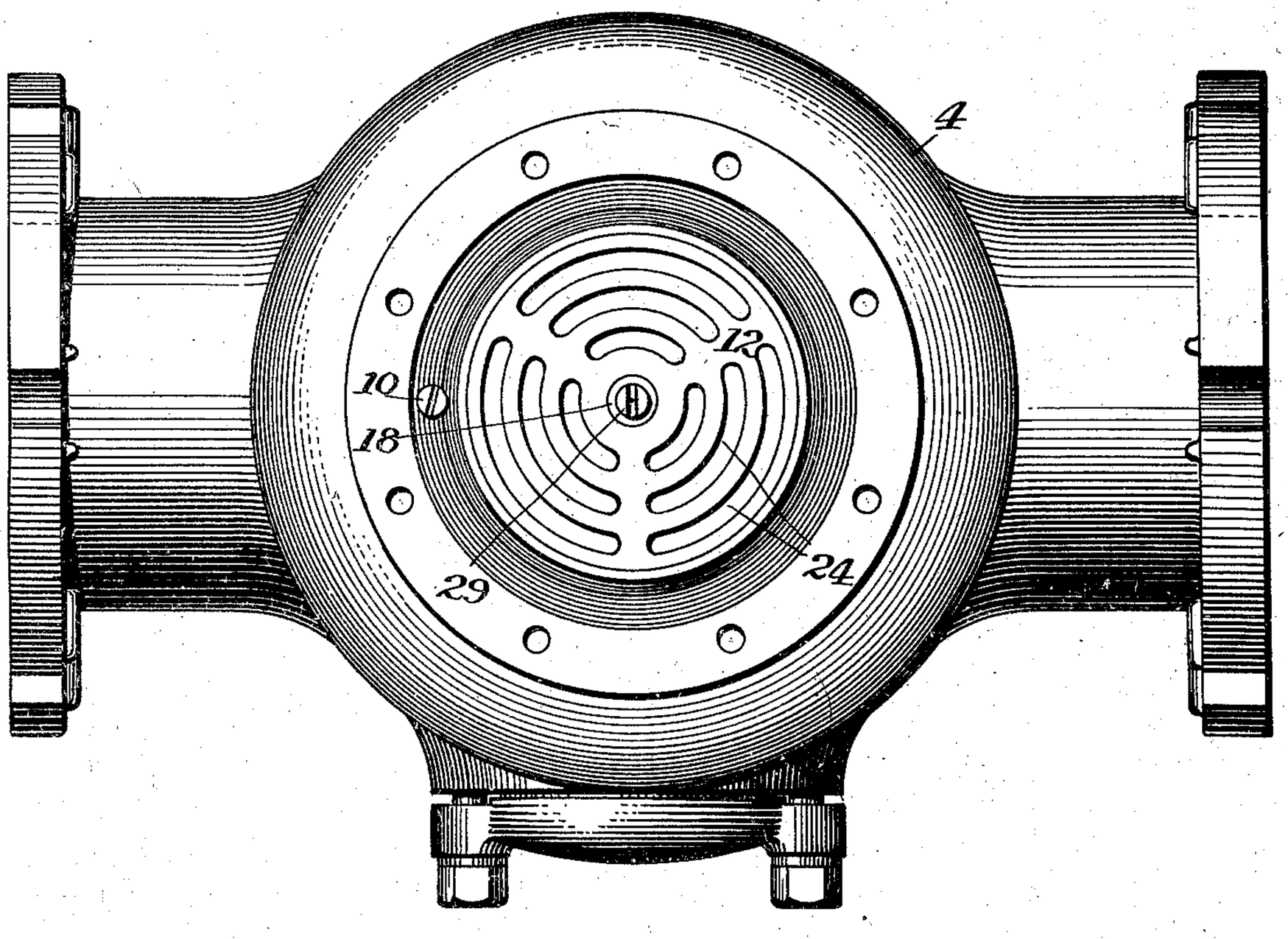
NO MODEL. 4 SHEETS—SHEET 3.

Fig. 3.



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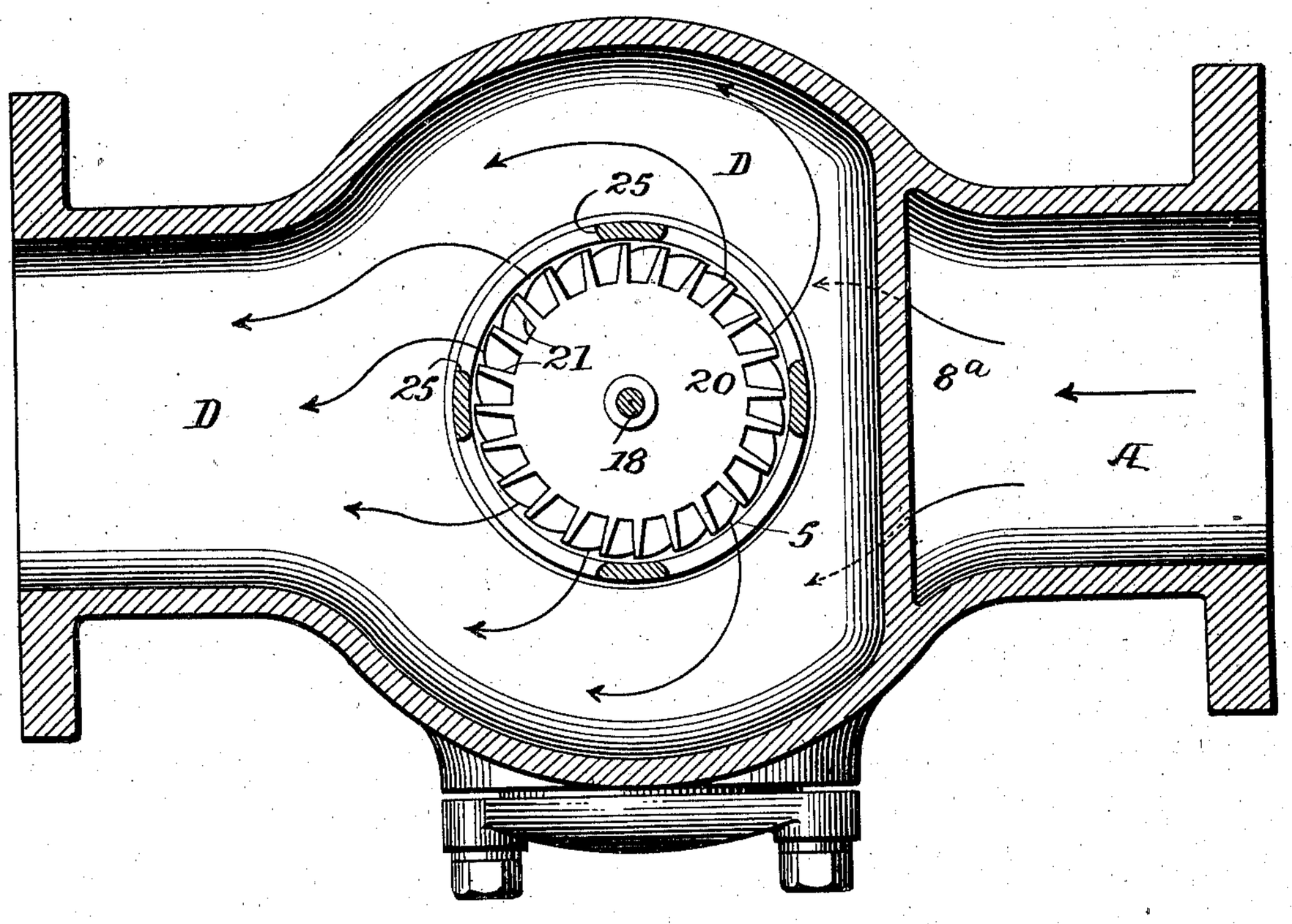
NO MODEL. 4 SHEETS—SHEET 4.

Fig. 4.



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UNITED STATES PATENT OFFICE.

JOHN THOMSON, OF BROOKLYN, NEW YORK.

WATER-METER.

SPECIFICATION forming part of Letters Patent No. 756,431, dated April 5, 1904.

Application filed May 13, 1902. Serial No. 107,133. (No model.)

To all whom it may concern:

Be it known that I, JOHN THOMSON, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Water-Meters, of which the following is a specification.

This invention relates to that type or class of water-meters generally known as the "inferential," the volume being inferred by ascertaining and recording the velocity of flow through a portion of the meter.

The particular objects of the invention are to obtain a high degree of sensibility, endurance, certainty of operation, compactness, convenience of inspection, and low cost of construction.

In the drawings, Figure 1 is a vertical longitudinal center section of a meter showing an embodiment of my invention. Fig. 2 is a vertical transverse center section. Fig. 3 is a top plan view, the cover being removed; and Fig. 4 is a horizontal center section.

The principle of the indicating device employed to indicate the velocity, and hence the volume, is that of a helice or screw whose axis coincides with the flowing stream and is caused to rotate on an axis at a right angle to the line of flow by the impact or friction of the moving water.

The invention is comprised in the combination and disposal of the apparatus and of the water-chambers whereby to accomplish the objects primarily and hereinafter set forth.

The inflowing stream from the pipe at A is caused to divide and pass up and down to the receiving-chambers B and C of the main or external casing 4.

The interior casing or cylinder 5 is mounted, preferably vertically, in a bearing 6, preferably tapered, formed in the upper and lower partitions 7 8, which, with the end wall 8^a, form the outlet-chamber D. The casing rests on the shoulder 9 and is secured against accidental displacement upwardly by the screw 10. Mounted in the ends of the cylinder are two heads 12 13, secured thereto by the screws or pins 14. Each head has an inwardly-projecting hub 15 16, which are preferably bushed, as with hard rubber 17, to form a bearing for the spindle 18. On this spindle are mounted two disks 19 20, having helical wings or blades, as 21, formed in or applied to their peripheries, the pitch of the helices in one disk being right hand, while the pitch of the other is left hand. The weight of the revolving structure is supported by a suitable step-bearing—say a roller-bearing—as denoted by 22. The outer edges of the helical wings do not make contact with the wall of the cylinder, and the disks are so spaced upon the spindle as to form an intermediate chamber P. The upper portions of the cylinder and also its heads are provided with a series of openings or slots, as 24, whose function is that of a strainer to prevent any material from reaching the helices that cannot readily pass through the spaces between the blades. Portions of the center of the interior cylinder are cut away to form egress openings or ports 25, leading from the intermediate chamber P. The disks are hollow and sealed water-tight, the compartments 26 being preferably so proportioned that the displacement will be such as will nearly but not quite cause the structure to float, thereby securing the minimum of inertia to movement and imposing but little duty upon the pivotal bearing of the spindle.

The register E and its internal reducing-gear train H are mounted in the cap 27, the primary pinion of the gear-train being suitably connected to be driven by the disks, as by the driving-arm 28, acting in the slot 29 in the upper end of the spindle.

As denoted by the arrows, the inflowing water passes to the upper and lower chambers B C in relatively equally large and slow-moving volumes and thence through the slots to the upper face of the upper disk and to the lower face of the lower disk. Thereafter the water flows in two streams, one down and the other up, through the spaces between the helices, thereby causing the disks, the spindle, and the register to revolve. The two streams, one from above and the other from below, after passing the blades of right and left hand pitch impinge upon and react against each other in the intermediate chamber P, thereafter flowing through the ports 25 to the outlet-chamber D and onto the pipe. It will

thus be seen that the hydraulic conditions, as to the effect of the flow upon the friction of the spindle, are such as to precisely neutralize or balance each other.

To realize the advantage thus pointed out, it is desirable that the form of the strainer slots or openings shall be a duplicate of the other both as to the contour of the several slots and as to their disposal and aggregate area in chambers B and C in that the condition of flow and supply to the helical spaces in the disks shall be practically identical.

In consequence of supplying the two chambers B and C with a large volume at low velocity and slight loss of head it is feasible to concentrate the obstruction to the flow at the helical spaces of the disks, thereby deriving high velocity of impact upon the blades, whereby to increase the sensibility of the meter at the lower rates of flow.

Particular attention is directed to the controlling mechanical advantages derived from the arrangement and construction herein described and illustrated—namely, that the rotating apparatus is subjected only to self-contained and counterbalanced strains, that the spindle is not required to resist any thrust due to hydraulic action in any direction, and that by simply removing the cap the interior casing and its contained apparatus complete and self-contained may quickly be withdrawn for inspection or substitution without removing the main casing from the circuit or disturbing the pipe. So, too, an exceedingly important hydraulic advantage is derived from placing all of the restricted water-passages in the single cylinder 5, which may thus be accurately formed to such contours as will produce conditions of flow most favorable to uniformity of registration at varying rates of drafts. In other words, both the hydrostatic and hydraulic conditions irrespective of the degree of pressure or the rate of velocity are precisely similar in the delivery-chambers B and C, and the same holds good as to the two streams which pass through the helical spaces of the disks 19 20, unite, and pass on under precisely the same conditions of obstruction.

I do not limit myself to the exact arrangement and mode of operation herein described. Thus it is feasible and in some instances may be desirable to reverse the direction of the flow receiving at chamber D and discharging into A, which obviously would not materially detract from several of the advantages of operation described.

I claim—

1. In a water-meter, the combination with a register, and a main casing having upper and lower receiving-chambers and an intermediate discharge-chamber, of a cylinder mounted in the walls of the intermediate chamber, bearing-heads mounted in the ends of said cylinder and having inwardly-extending hubs, a spindle supported in the hubs, and two disks mounted on said spindle, the disks having helical blades, one of left-hand and the other of right-hand pitch, portions of the cylinder being cut away near its center to form egress-ports, and the upper and lower portions of the cylinder being provided with slots, the arrangement and construction being such that the water from the upper and lower receiving-chambers is delivered to the disks and discharged into the intermediate chamber between the disks, substantially as described.

2. The combination with the chambers B and C, of the cylinder and its heads with revolving disks mounted in the cylinder, the said heads and also the upper and lower portions of the cylinder extending beyond the disks being provided with slots whose form, area and disposal are practically identical, compared one end with the other, substantially as and for the purpose described.

3. The combination with the cylinder and its bearing-heads of the right and left hand pitch helical disks and their spindle, the said disks having sealed compartments of such capacity as to render the revolving structure nearly buoyant, substantially as and for the purpose set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN THOMSON.

Witnesses:
JOHN MCKINNON,
LEWIS MORTIMER.