

No. 714,424.

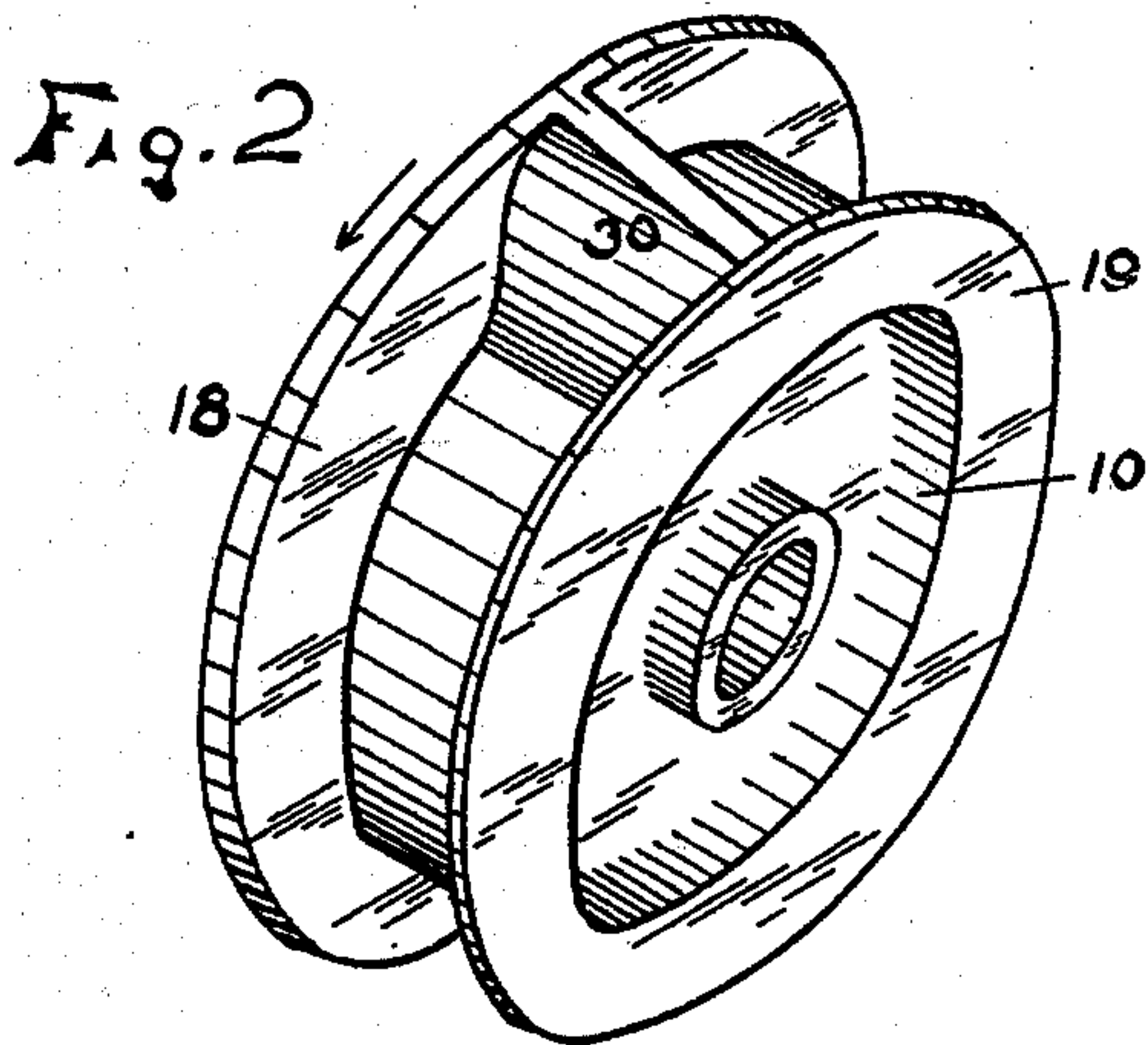
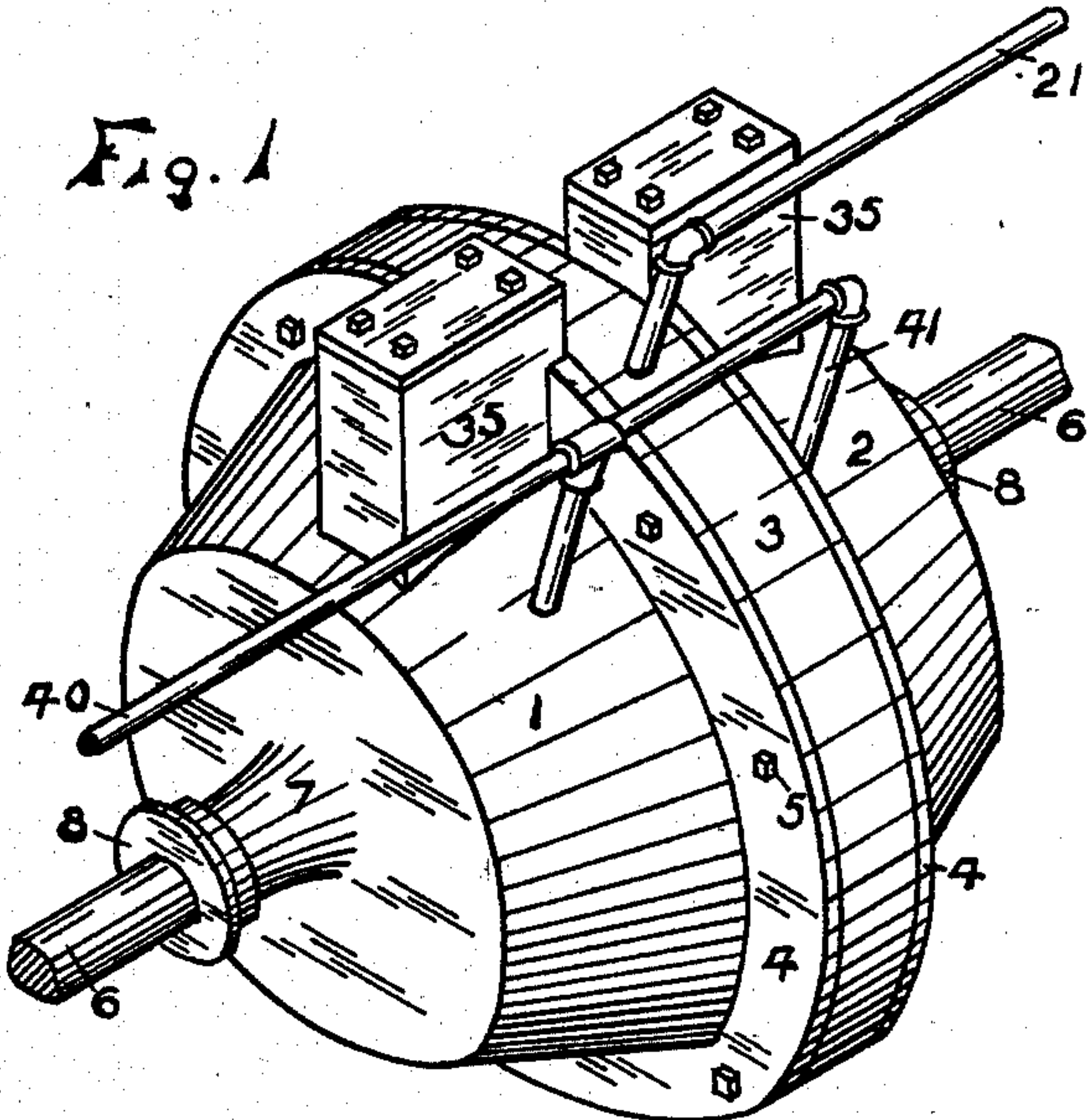
Patented Nov. 25, 1902.

J. F. WILLIAMS.
ROTARY ENGINE.

(Application filed July 19, 1901.)

(No Model.)

4 Sheets—Sheet 1.



WITNESSES:

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F. C. Bryant.

INVENTOR.

James F. Williams.
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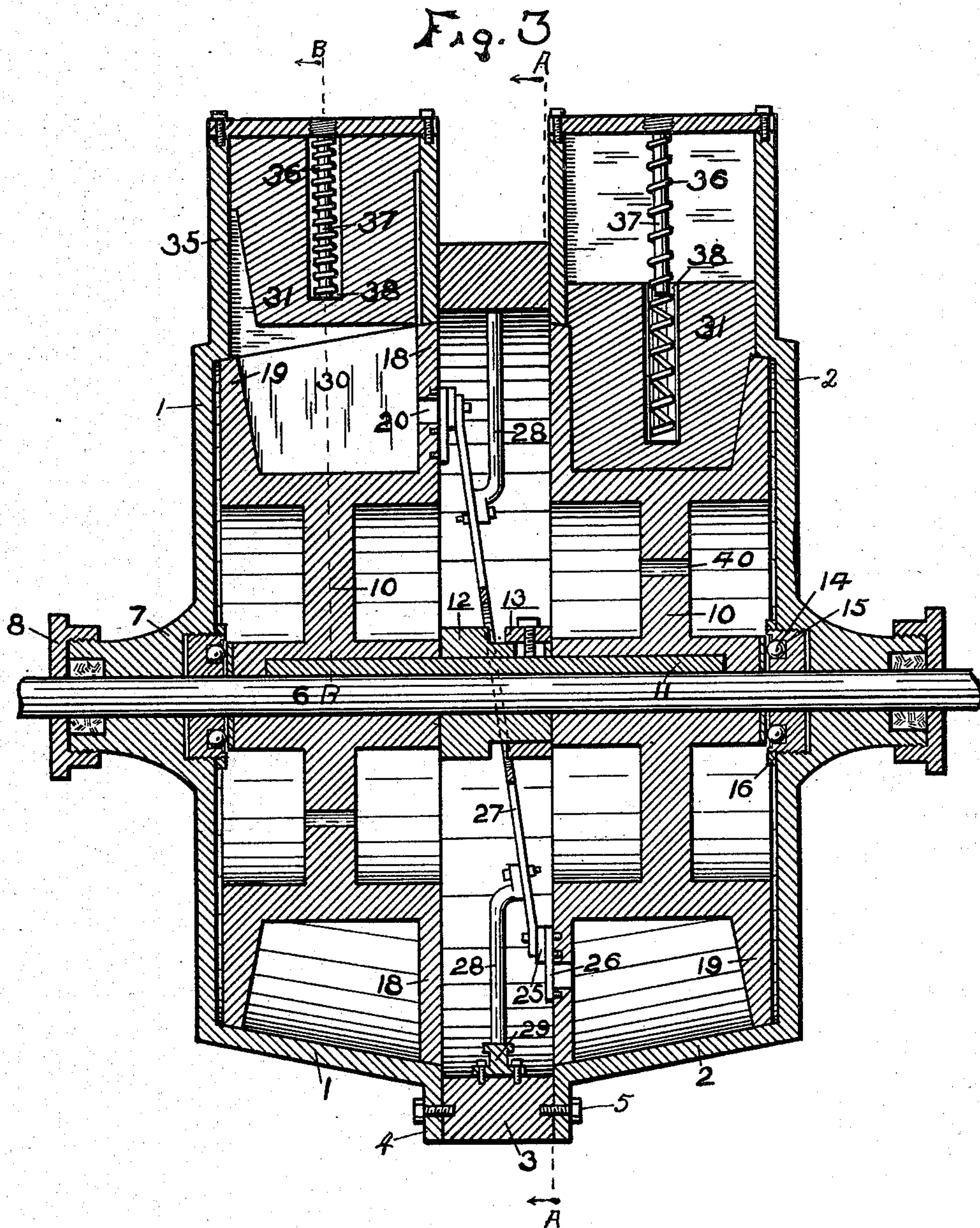
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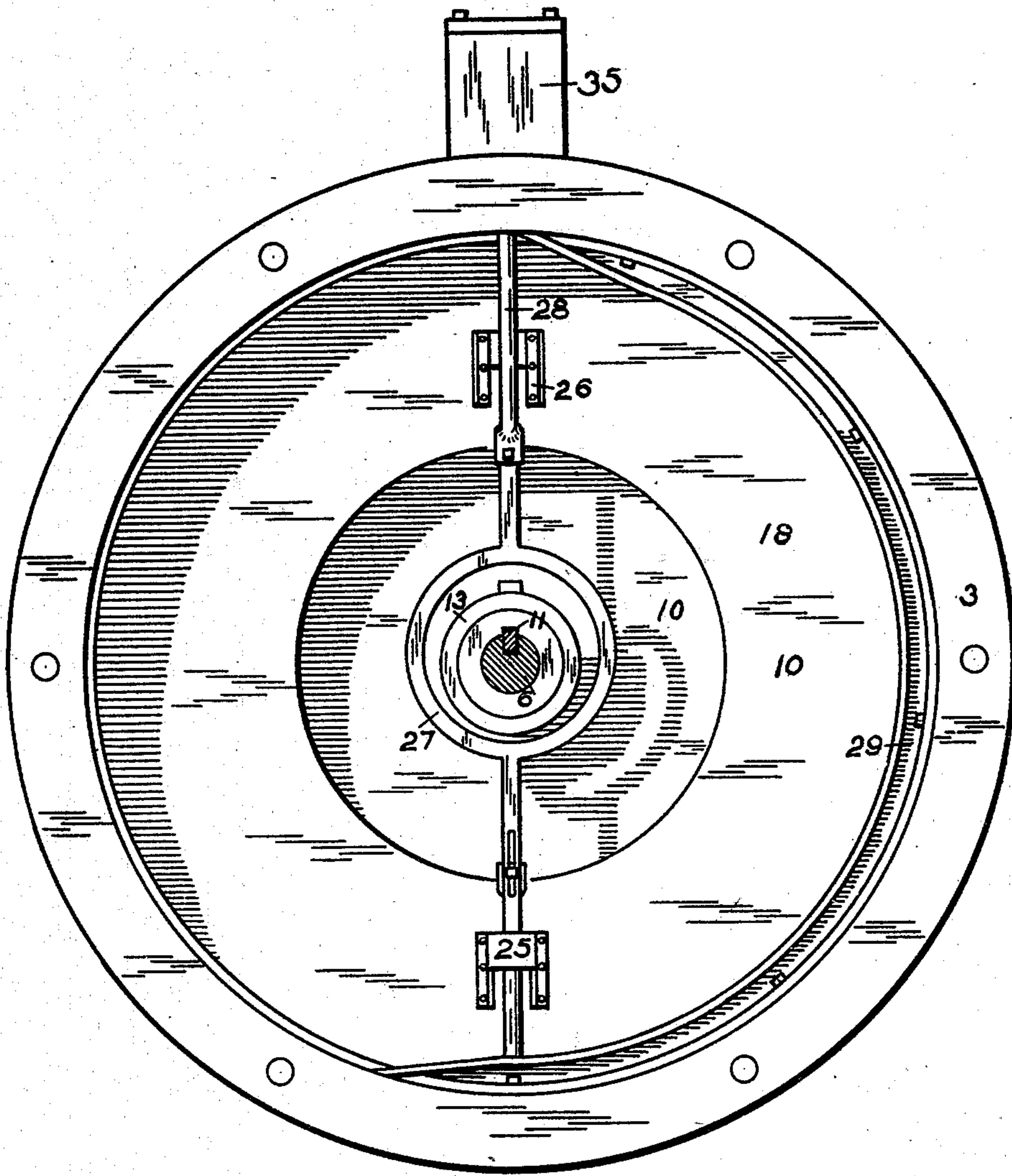
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Fig. 4



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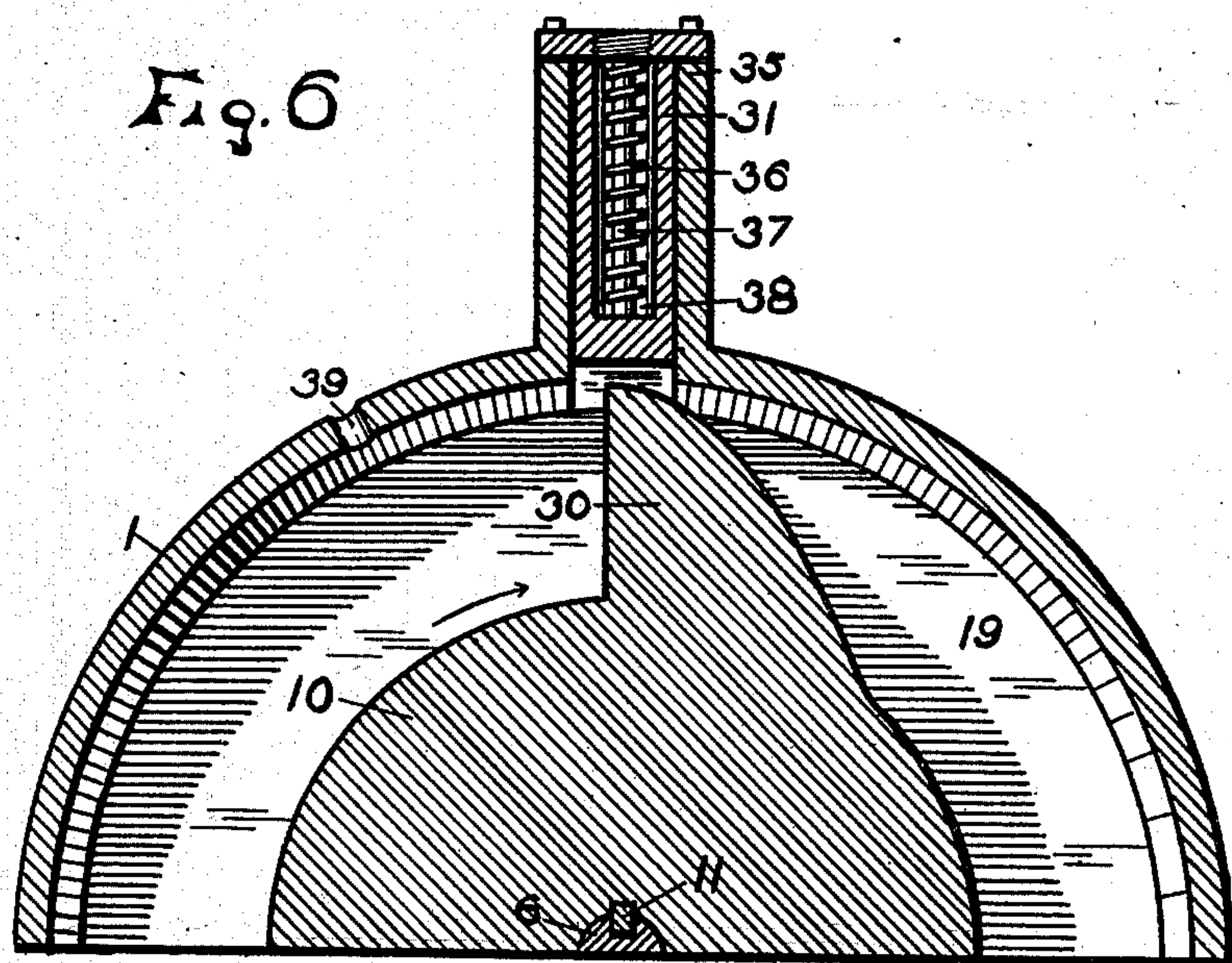
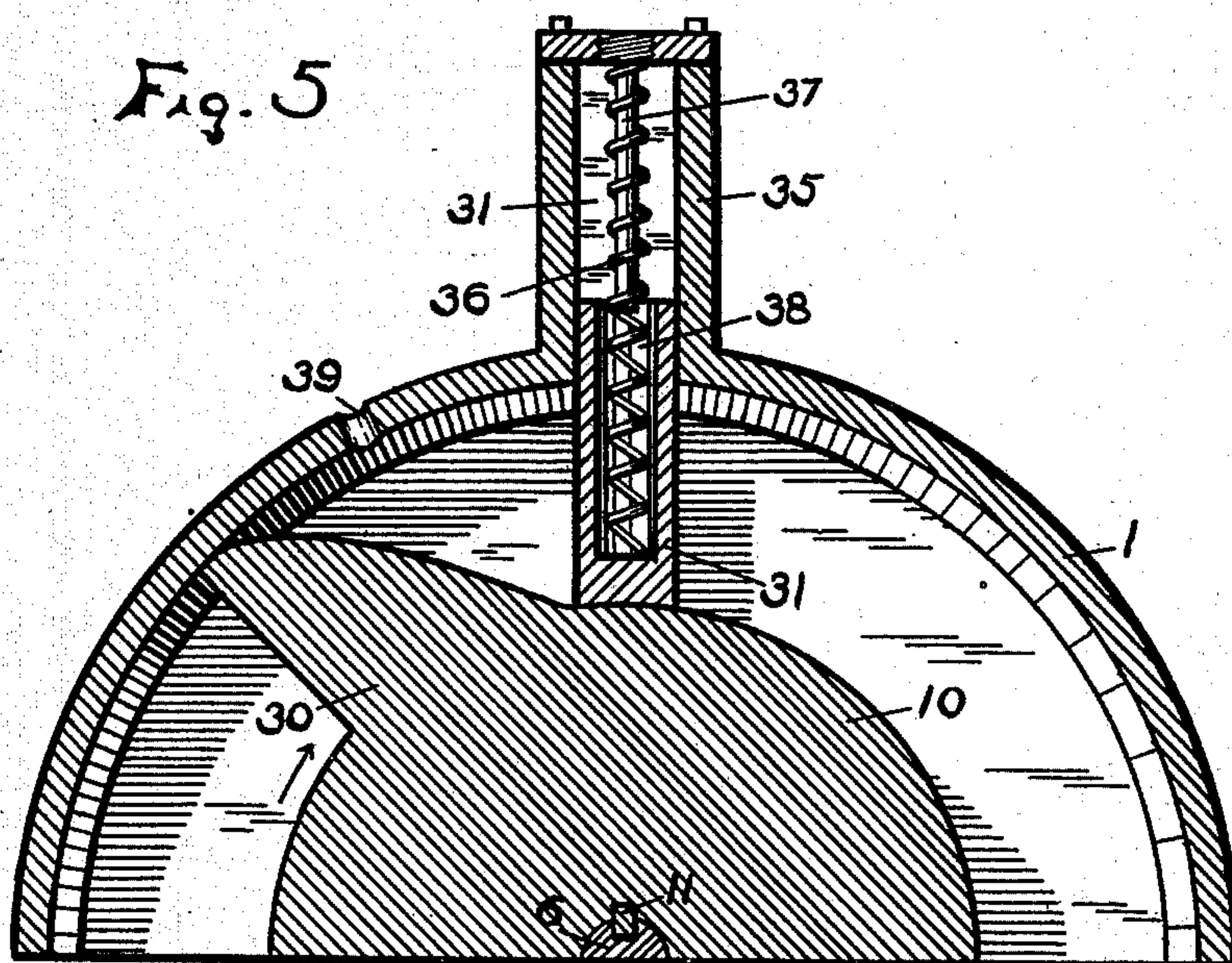
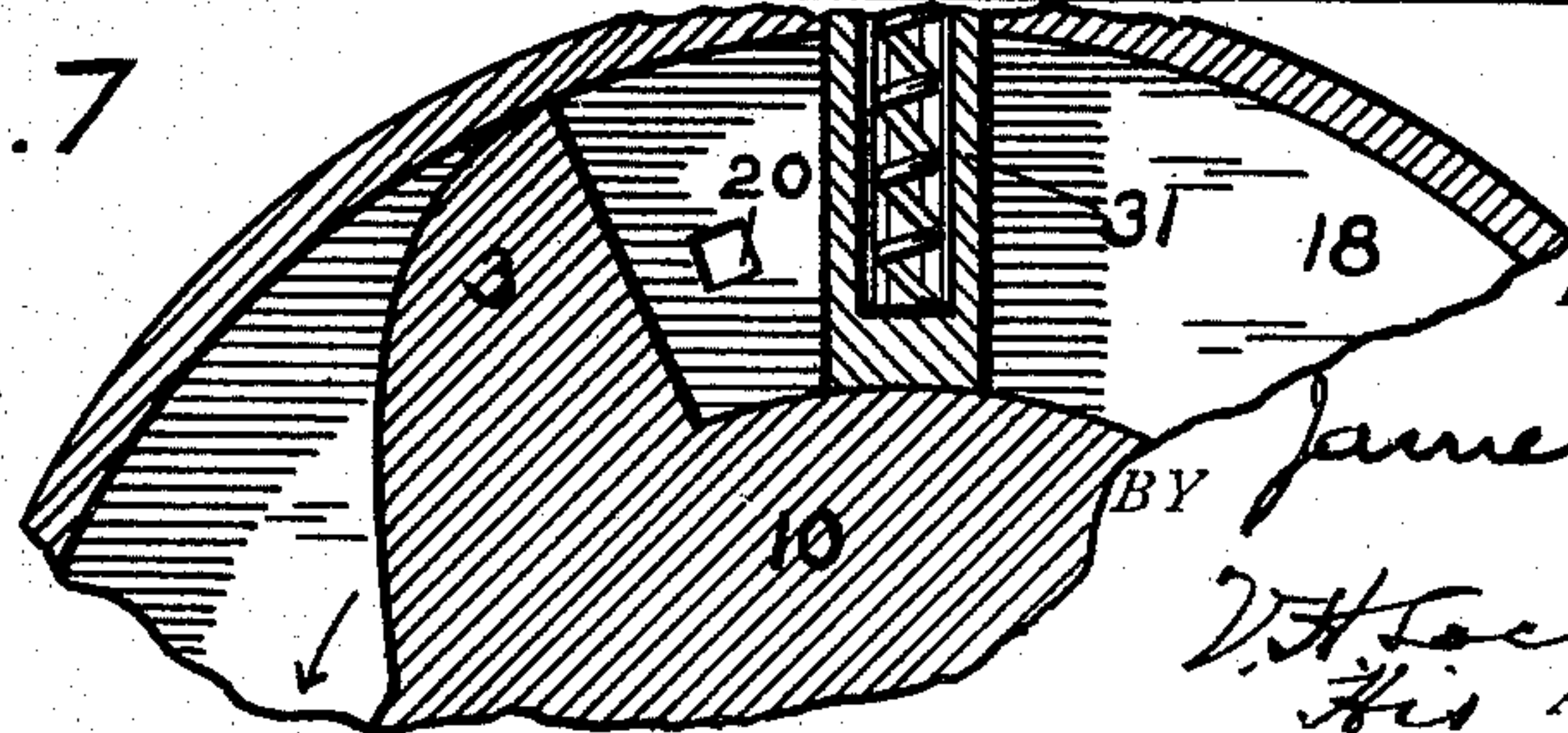


Fig. 7



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UNITED STATES PATENT OFFICE.

JAMES FRANKLIN WILLIAMS, OF VINCENNES, INDIANA, ASSIGNOR OF
TWO-THIRDS TO FRANCIS SCHENKER, OF VINCENNES, INDIANA.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 714,424, dated November 25, 1902.

Application filed July 19, 1901. Serial No. 68,976. (No model.)

To all whom it may concern:

Be it known that I, JAMES FRANKLIN WILLIAMS, of Vincennes, county of Knox, State of Indiana, have invented a certain new and
5 useful Rotary Engine; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, in which like numerals refer to like parts.

10 The object of this invention is to make a rotary engine that cuts off the steam at each half-revolution of the wheel, whereby during half the revolution of the wheel the steam acts directly thereon to propel it and during
15 the remaining half the steam acts on the wheel by expansion. By making a pair of said wheels with means for alternately receiving and cutting off the steam I gain the benefit arising from the expansion without any
20 loss of uniformity of speed.

Another feature of the invention consists in tapering the wheels, so that the wear of the machine will be taken up.

25 The invention will be clearly understood from the accompanying drawings and the following description and claims.

In the drawings, Figure 1 is a perspective of the engine. Fig. 2 is a perspective of one of the wheels therein. Fig. 3 is a central vertical longitudinal section of the engine. Fig.
30 4 is a cross-section on the line A A of Fig. 3, showing one section of the device in inside elevation. Fig. 5 is a cross-section of the upper half of the machine on the line B B of
35 Fig. 3, showing the position of the wheel, however, as its piston-head approaches the abutment-blade and just before the exhaust-port is reached. Fig. 6 is the same, showing the position of the wheel after its piston-head
40 has passed the exhaust-port and has elevated the abutment-blade. Fig. 7 is a portion of the same section as Figs. 5 and 6 looking in the opposite direction after the piston-head on the wheel has passed the abutment-blade
45 and the latter has dropped down and steam enters between them.

The casing is formed of three sections or parts 1, 2, and 3, secured together. The parts
50 1 and 2 are formed like the frustum of a cone, with a peripheral flange 4 on each side of the central section or ring 3, and the three parts

are bolted together by the bolts 5, as appears in Fig. 1. The shaft 6 to be driven extends through the casing in bearings 7, provided with suitable packing held in place by the
55 threaded caps 8.

Within the casing two wheels 10 are mounted securely on the shaft 6 by a spline 11. The peripheries of these wheels taper to fit closely yet loosely in the tapering sections 1 and 2 of
60 the casing, as shown in Fig. 3. The wheels 10 are held apart and in their respective ends of the casing by the sleeve 12, having on it the adjustable sleeve 13, and the wheels 10 are held out of too close contact with the ends
65 of the casing by the ball-bearings 14 against the outer ends of the hubs of the wheels. The balls 14 are carried in a suitable cup 15, that is externally threaded to screw into and be adjustable in a corresponding recess in the
70 bearings 7 on each side of the casing. A ring 16 is provided for locking the cups 15 in place. The wheels 10 have a central hub, with a web extending therefrom to the outer periphery. The outer peripheries of these wheels are provided
75 with a circumferential channel, which has for its sides the annular flange 18 on the inner side and the tapering annular flange 19 on the outer side, as shown in Figs. 2 and 3. This channel is in one sense a steam-cylinder,
80 into which steam is admitted through the port 20 from the interior of the casing, which is the steam-chest, steam being supplied thereto through the pipe 21. (Seen in Fig. 1.) Said pipe enters the ring 3, and it is immaterial
85 where it enters.

The steam which has entered the steam-chest or main chamber within the casing is admitted into the annular peripheral channel of the wheels by the sliding valves 25, which
90 alternately open and close the inlet-ports 20. In Fig. 3 the lower port is open and the upper one is closed. The valves 25 are plates sliding in guideways 26, secured to the side of the annular flange 18, as appears in Figs.
95 3 and 4. Both valves 25 are secured to a connecting-rod 27, which is enlarged into a ring as it passes around the shaft 6 and sleeves 12 and 13, as is seen in Fig. 4. Any other form of this connecting-rod will suffice. The con-
100 necting-rod is reciprocated by the arms 28, secured thereto at each end, which alter-

nately for a full half-revolution are pushed inward or actuated by the flange 29, that is secured to the ring 3, as shown in Fig. 4. As soon as one arm 28 rides off said flange the other rides upon it, and thus the ports 20 are alternately opened and closed to admit steam to the wheels. The wheels are rotated by the steam entering the peripheral channels thereof between the piston-head 30 and the abutment-blade 31, as shown in Fig. 7.

The abutment-blade 31 does not rotate with the wheel 10, and since the piston-head 30 on the wheel is rotatable therewith the steam entering between them will force the piston-head 30 away from the abutment-blade 31, and thereby rotate the wheel. The incoming steam will act directly to accomplish this result during the first half-revolution of the wheel while the port 20 is open and will tend to propel the wheel by means of expansion during the remainder of the revolution. As shown in Fig. 3, the right wheel is approaching the end of the half-revolution during which it is actuated directly by the ingoing steam, while the wheel to the left is approaching the end of the half-revolution during which it is actuated by the expansion of the steam that has entered its channel.

The piston-head 30 is practically a partition in the channel of the wheel 10, inclined on its outer edge to correspond with the inner surface of the casing. The abutment-blade is mounted so as to be vertically movable in the boxes 35 on sections 1 and 2 of the casing and above the wheels 10, as appears in Figs. 1 and 3. The abutment-blades are merely plates, which when depressed fit snugly in the channel of the wheel 10, as shown at the right hand in Fig. 3 and as is seen in Fig. 7. The abutment-blade is depressed by the spiral spring 36, surrounding the guide-rod 37, said spring and guide-rod extending into the recess or well 38 in the abutment-blade. Said plates are also guided by the boxes 35, in which they are mounted, as appears in Figs. 5 and 6.

On the forward side the piston-head 30 in the wheel 10 is inclined, as shown in Figs. 5 and 6, so as to elevate the abutment-blade from the position shown in Fig. 5 to that shown in Fig. 6 or from the position shown at the right hand in Fig. 3 to that shown at the left hand of Fig. 3. The exhaust-ports 39 lead into the exhaust-pipes 41 from a point in sections 1 and 2 of the casing just in front of the boxes containing the abutment-blades, as appears in Figs. 1 and 5, so that as the wheel 10 approaches the end of its revolution and while it is elevating the abutment-blade the charge of steam which has propelled the wheel during such revolution will be exhausted. The momentum of the wheel, and the action of the other wheel on it, will cause the wheel after it passes the exhaust-port to pass beyond the abutment-blade, whereupon the abutment-blade is pushed down again into the

channel and steam is at that point introduced between the abutment-blade by reason of the flange 29 actuating the slide-valve 25 to open the port. The upper port will be open and the lower port closed after the wheels have been rotated just a little beyond the position in which they are shown in Fig. 3.

The wheels 10 are balanced by the openings 40 through the webs thereof, whereby the pressure of the steam within the casing will be on both sides of the wheels to avoid jamming them endwise against the ends of the casing.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. A rotary engine including a casing, a wheel therein having a circumferential channel with a piston-head in said channel, a steam-inlet port leading into said channel behind the abutment, a valve for opening and closing said port, and means on the casing for actuating said valve.

2. A rotary engine including a casing, means for introducing steam into said casing whereby the interior of the casing will be a steam-chest, a wheel mounted in said casing having a circumferential channel the two sides of which engage the casing substantially steam-tight, a piston-head in said channel of the wheel, the outer edge of which engages the casing, a removable abutment-blade in the channel, a steam-inlet port leading from the interior of the casing into said channel of the wheel behind said piston-head, a valve mechanism for opening and closing said steam-inlet port, and means on the casing for actuating said valve when desired.

3. A rotary engine including a casing with a chamber therein, means for introducing steam into said chamber whereby it becomes a steam-chest, a wheel mounted in said steam-chest which is circumferentially channeled and the periphery of which fits the casing steam-tight, a piston-head in the channel of the wheel, a removable abutment-blade held in such channel, a valve-controlled inlet-port leading from the steam-chest through the side of the wheel into said channel behind the piston-head.

4. A rotary engine including a casing with a chamber therein, means for conveying steam to said chamber whereby it becomes a steam-chest, a shaft extending through said steam-chest, a pair of wheels mounted on the shaft in said chest which are circumferentially channeled, and with their peripheries fitting the casing steam-tight, a piston-head in the channel of the wheel, a removable abutment-blade held in said channel, and valve-controlled inlet-ports leading from the steam-chest through the sides of the wheels into the channels thereof behind the piston-head.

5. A rotary engine including a casing, a pair of wheels therein mounted side by side with a chamber between them and circum-

ferentially channeled with the sides of the channel fitting steam-tight within the casing, a piston-head in the channel, a removable abutment-blade held in the channel of each wheel, means for introducing steam into the chamber within the casing between the wheels, a steam-inlet port from said chamber into the channel in each wheel, and means for opening and closing said ports alternately with each other.

6. A rotary engine including a casing, means for introducing steam therein, a pair of wheels mounted in the opposite ends of said casing and so formed as to be driven by steam, a pair of steam-inlet ports that are located diametrically opposite each other through which steam is supplied for driving said wheels, valves for opening and closing said ports, a semicircular flange on the inner wall of the casing, and means connected with said valves that engage said flange, whereby the valves will be actuated during the revo-

lution of the wheels and cause them to alternately open and close said ports.

7. A rotary engine having a casing with two oppositely-tapering ends, a shaft extending therethrough, a pair of wheels mounted on said shaft one in each tapering end of the casing with space between them and with their peripheries circumferentially channeled and engaging the casing, means for introducing steam into the chamber between the wheels, ports leading from said chamber into the channels in the wheels, and openings through the wheels whereby they will be balanced.

In witness whereof I have hereunto affixed my signature in the presence of the witnesses herein named.

JAMES FRANKLIN WILLIAMS.

Witnesses:

NORMAN E. BECKER,
W. W. JOHNSON.