No. 824,113. PATENTED JUNE 26, 1906.

J. A. GROSHON.

TURBINE ENGINE.

APPLICATION FILED JUNE 25, 1904.

4 SHEETS—SHEET 1.

Fig. 1.

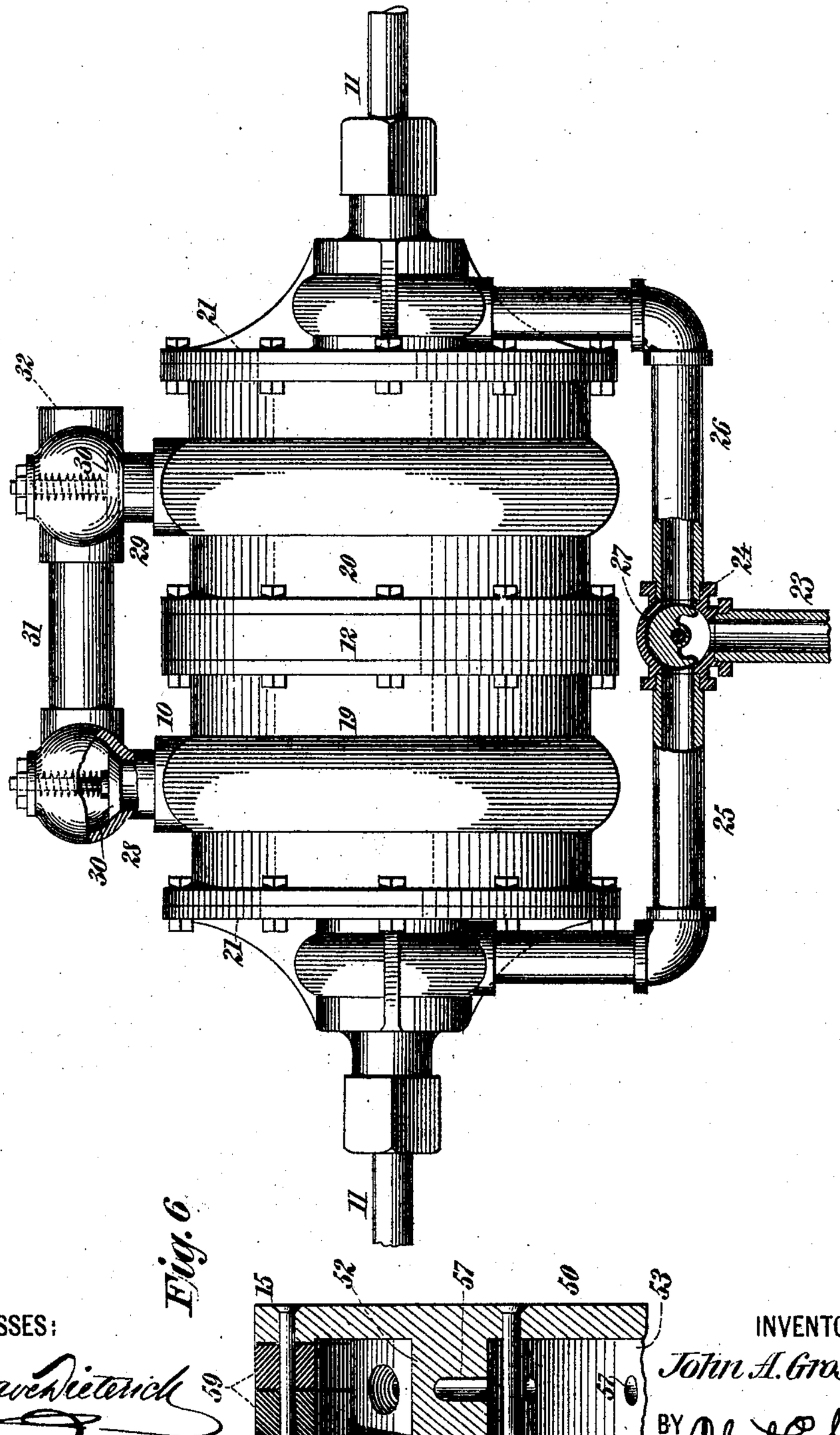

Fig. 6.

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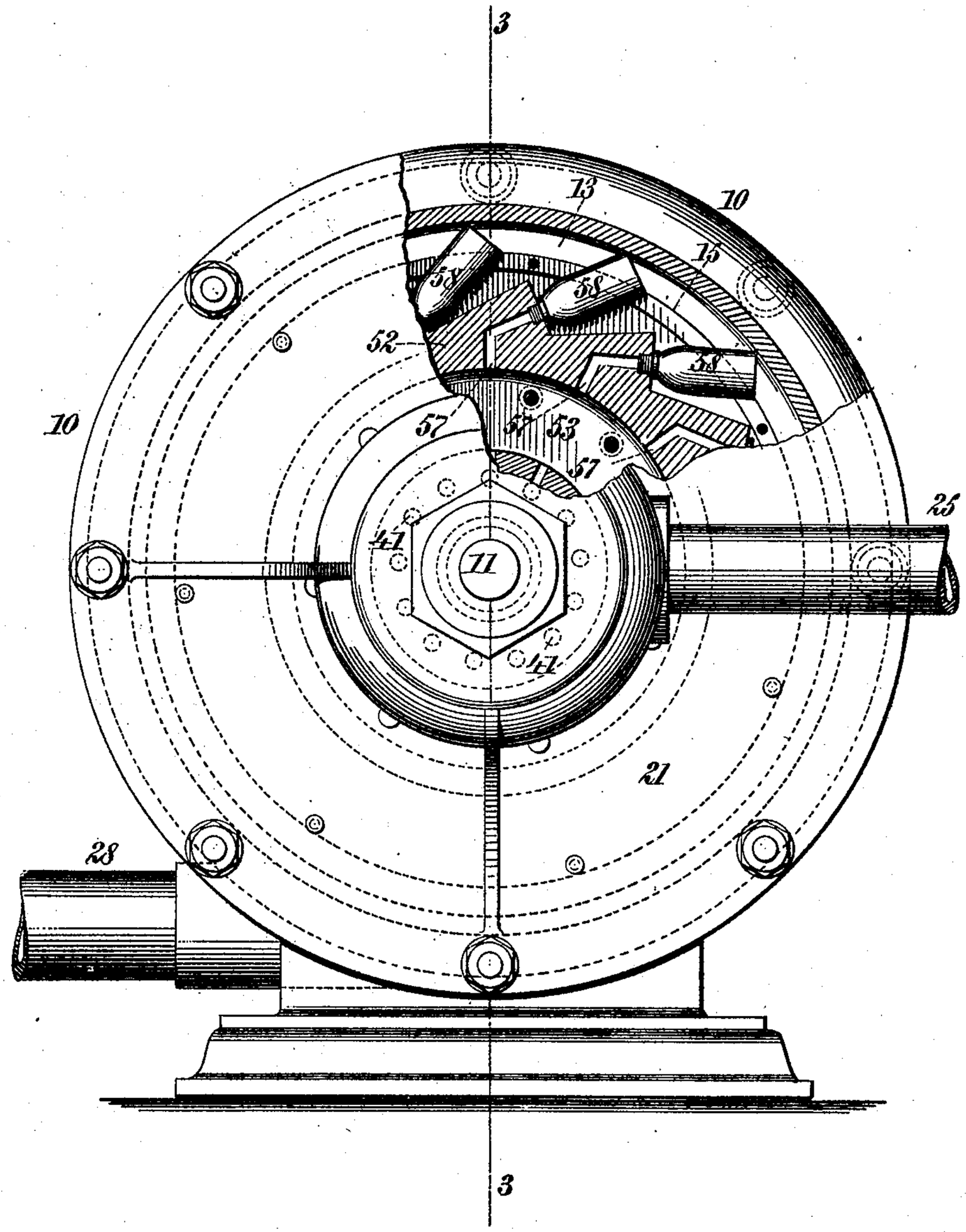
4 SHEETS—SHEET 2.

Fig. 2.



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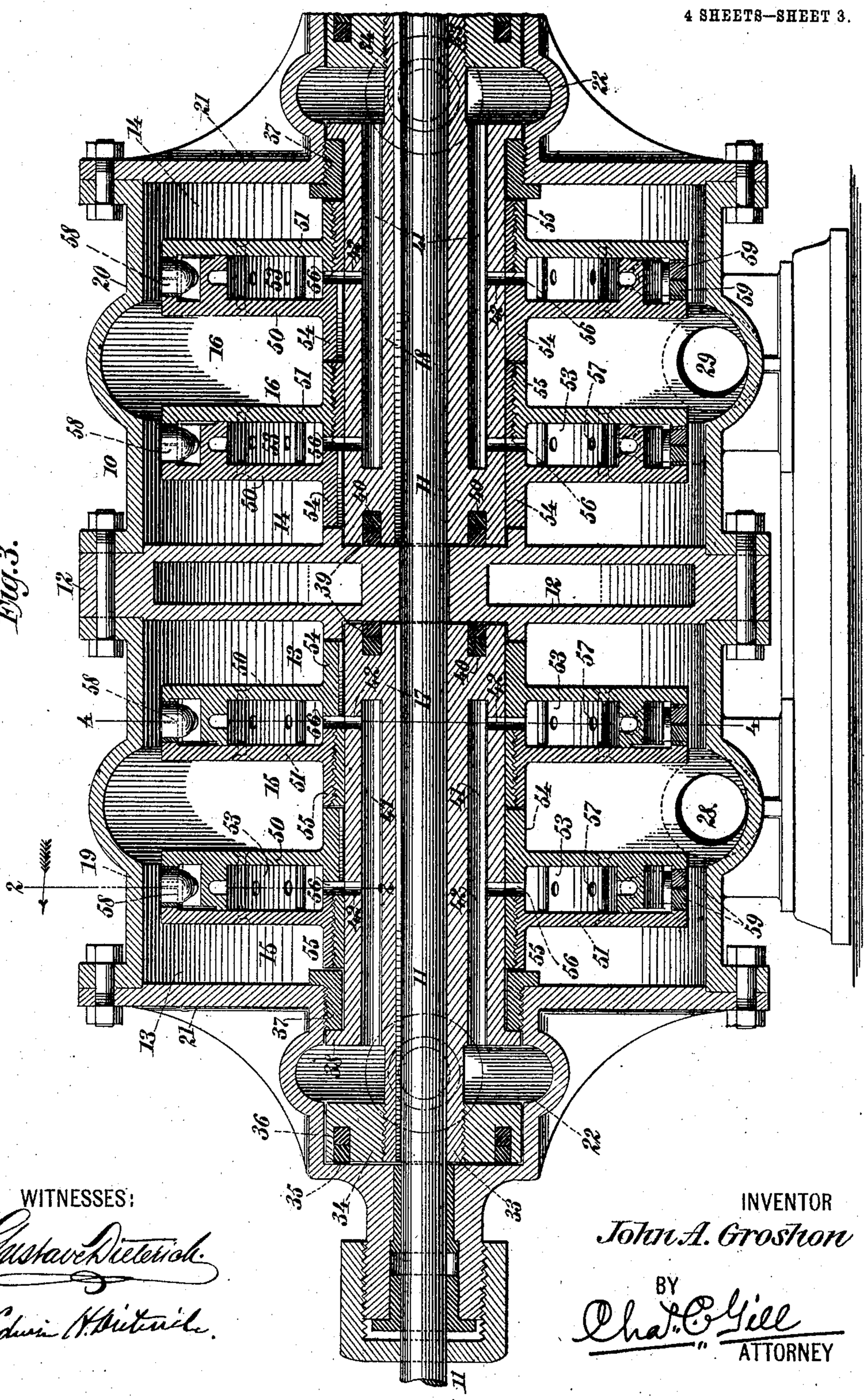
4 SHEETS—SHEET 3.

Fig. 3.



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4 SHEETS—SHEET 4.

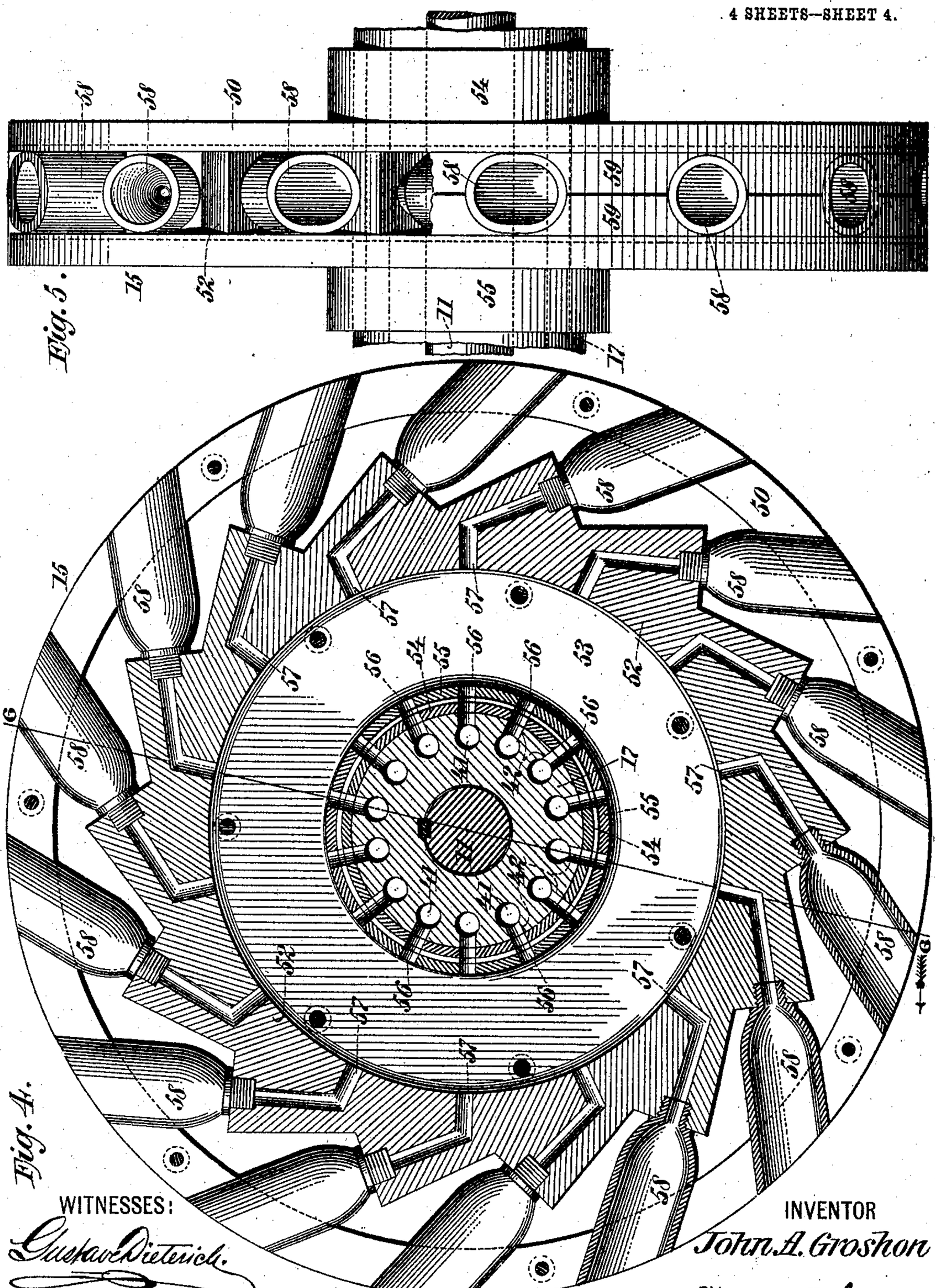

Fig. 5.

Fig. 4.

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UNITED STATES PATENT OFFICE.

JOHN A. GROSHON, OF NEW YORK, N. Y.

TURBINE-ENGINE.

No. 824,113. Specification of Letters Patent. Patented June 26, 1906.

Application filed June 25, 1904. Serial No. 214,117.

To all whom it may concern:

Be it known that I, JOHN A. GROSHON, a citizen of the United States, and a resident of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Turbine-Engines, of which the following is a specification.

The invention relates to improvements in rotary or turbine engines; and it consists in the novel features and combinations of parts hereinafter described, and particularly pointed out in the claims.

The object of the invention is to provide a more efficient and economical rotary or turbine engine than those heretofore known to me and in the preferred construction to produce an engine which may be utilized in driving the shaft in either direction, this latter feature being particularly desirable for marine engines, in which it is necessary at times to reverse the motion of the driving-shaft.

I present my invention in this application as comprising an exterior casing through which the shaft to be driven passes and which is subdivided by a partition into two chambers, within one of which one or more right-hand wheels are provided for driving said shaft in one direction and in the other of which one or more left-hand wheels are provided for driving said shaft in the reverse direction. The wheels or rotary members provided within the chambers of the exterior casing are keyed upon hubs, which are in turn keyed upon the shaft to be driven, and these hubs are hollow or contain passages for the steam, said passages communicating through the ports with the rotary members, whereby steam is allowed to pass to said members for driving the same, and the shaft to be driven is not weakened, but preserved in its original condition.

While my invention is not limited in every instance to the special construction of wheel or rotary member presented herein, the said wheel is of novel construction and constitutes a part of my invention, and the said wheel or rotary member, together with the other novel features of the invention, will be fully understood from the detailed description hereinafter presented, reference being had to the accompanying drawings, in which—

Figure 1 is a top view of an engine constructed in accordance with and embodying the invention. Fig. 2 is an end elevation, partly in section, of same, the sectional portion of Fig. 2 being on the dotted line 2 2 of Fig. 3. Fig. 3 is an enlarged central vertical longitudinal section of same on the dotted line 3 3 of Fig. 2. Fig. 4 is an enlarged vertical transverse section through one of the wheels or rotary members of the engine on the dotted line 4 4 of Fig. 3. Fig. 5 is a detached edge view, partly broken away, of one of the wheels or rotary members of the engine; and Fig. 6 is a detached sectional view through a portion of one of the wheels or rotary members, taken on the dotted line 6 6 of Fig. 4.

In the drawings, 10 designates the exterior casing as a whole; 11, the shaft to be driven; 12, the transverse partition separating the casing into two chambers, (designated 13 14, respectively;) 15, wheels or rotary members mounted within said chamber 13; 16, wheels or rotary members mounted within said chamber 14; 17, a hub keyed upon the shaft 11 and having the wheels or rotary members 15 keyed upon it, and 18 a corresponding hub keyed upon the shaft 11 and having the wheels or rotary members 16 keyed upon it.

The casing 10 comprises the cylindrical sections or shells 19 20, between which the partition 12 is bolted, and upon the outer ends of which are the heads 21, which correspond with each other and are provided at their outer ends with suitable bearings and stuffing-boxes for the shaft 11. Within the heads 11 are formed chambers 22, connected with a pipe 23, Fig. 1, leading from a suitable source of supply for the steam or other fluid, this pipe 23 being by means of a valve-chamber 24 connected with branch pipes 25 26, one of which leads directly to the chamber 22 in one of the heads 21 and the other of which leads to the chamber 22 in the other of said heads. The valve within the chamber 24 is designated by the numeral 27, and this valve may, as will be readily understood, be turned to place the pipe 23 into communication either with the pipe 25 or the pipe 26, as may be desired, and may also be turned to close off both of said pipes from the pipe 23. The chambers 22 constitute the inlets for the steam, and the exhaust for the steam from the chambers 13 14 is shown in Fig. 1 and comprises the outlets 28 29, containing automatic check-valves 30, these outlets 28 29 preferably being connected by a pipe 31, so that the exhaust through the outlet 28 may pass through said pipe 31 and above the check-valve 30 for the outlet 29 and thence escape through a main discharge 32.

Upon the shaft 11 are keyed the hubs 17 18, the hub 17 being within the chamber 13 and extending outwardly to the left into the adjacent chamber 22 and the hub 18 being within the chamber 14 and extending outwardly toward the right into the chamber 22, adjacent thereto. The hubs 17 and 18 correspond in every respect with each other, and each of said hubs is formed at its outer portion with the reduced extension 33, which is threaded and receives the balancing-hub 34, the latter rather closely fitting within the outer portion of the chamber 22 and having a faced packing-ring 35 in engagement with the inner end face of said chamber 22, the ring 35 being kept in contact with said face by means of an elastic medium 36 engaging the inner edges of said ring. The purpose of the ring 35 is to exclude the steam from the major portion of the outer face of the hub 34 and the outer end of the extension 33 of the hub 17. The outer end of the main body of the hub 17 is separated by a space from the inner face of the hub 34, as shown in Fig. 3, and it is into this space that the steam is admitted within the chamber 22. The hub 17 at its outer portion is mounted within a bearing-sleeve 37, screwed into the head 21, the hub 17 being provided with an annular flange 38, extending outwardly over the outer end of said sleeve. The hub 17 at its inner end carries a faced packing-ring 39, engaging the partition 12 and held against said partition by an elastic medium 40. Within the hub 17 are formed the series of longitudinal channels 41, which are open at their outer ends to receive the steam from the chamber 22 and are in communication with the transverse ports 42, through which the steam passes to the rotary members of the engine, said rotary members being keyed upon said hub.

The hub 18 corresponds in construction with the hub 17 and like the latter is formed with steam-passages 41 and ports 42 and mounted at its outer end within a sleeve 47. The hub 18 is also provided with a packing-ring 39 to engage the partition 12 and a yielding or spring backing 40 for said ring. The wheels or rotary members 15 16 correspond in construction with each other, except that the wheels 16 are reversely mounted on the shaft 11 to the wheels 15, whereby the wheels 16 become left-hand wheels for driving the shaft 11 in a reverse direction, while the wheels 15 are right-hand wheels. Each of the wheels 15 16 comprises two sides or disks 50 51, riveted together, as shown in Fig. 6, the disk 50 being formed with the annular flange 52 on its side to engage the face of the disk 51, and thereby form between said flange and the hub of the wheel a steam-chamber 53. The disk 50 is formed with a hub 54, keyed on the hub 17 (or 18, as the case may be) and receiving on its reduced and threaded outer portion the internally-threaded hub 55 of the disk 51. The hubs of the wheels 15 16 are each formed with ports 56 in register with the ports 42 of the hubs 17 18, whereby the steam may pass from the passages 41 of said hubs through the ports 42 56 and enter the chambers 53 of said wheels. The annular flange 52 of each disk 50 is formed with a series of corresponding substantially right-angular ports 57, whose outer members are tangentially disposed, Fig. 4, and are in communication with the discharge-nozzles 58, screwed into the said flange. Filling-rings 59 are preferably secured between the outer edges of the disks 50 51 and around the nozzles 58, as indicated at the lower portion of Figs. 3 and 5 and in Fig. 6, so as to lend rigidity and strength to the wheels and aid in very firmly holding the nozzles 58 in position. The outer end edges of the nozzles 58 may be trimmed off to follow the periphery of the wheel, as denoted by solid lines in Fig. 4, or be allowed to project beyond said periphery, as shown in Fig. 2.

In the operation of the engine the shaft 11, hubs 17 18, and wheels 15 16 will always rotate together in the same direction; but either the wheels 15 or 16 will rotate idly without being exposed to the action of the steam in accordance with the direction of motion of the shaft 11, the wheels 16 rotating idly when the shaft 11 is being driven by the wheels 15 and the wheels 15 rotating idly when the shaft 11 is being driven in a reverse direction by the wheels 16. It is my purpose to exhaust the air from the chambers 13 14, so that the wheels 15 16 may as nearly as possible rotate in a vacuum, and the partition 12 will prevent the passage of steam or air from one to the other of said chambers. If it should be desired to drive the shaft 11 in a forwardly direction, the valve 27 will be turned to direct the steam from the pipe 23 into the pipe 25 and thence into the left-hand chamber 22, intermediate the hub 34 and the main body of the hub 17, whence the steam will pass through all the passages 41 in said hub 17 and thence through the ports 42 56 into the chambers 53 of the wheels 15, from which the steam will escape through the ports 57 and nozzles 58 and in escaping effect the rotation of the wheels 15 and shaft 11. The exhaust-steam will find its escape through the outlet 28. When it is desired to reverse the motion of the shaft 11, the valve 27 will be turned to cut off the pipe 25 and place the pipes 23 26 into communication with each other, so that the steam may then pass into the right-hand chamber 22, hub 18, and left-hand wheels 16 and rotate the latter, the exhaust-steam leaving the wheels 16 finding an escape through the outlet 29. The steam may thus be conveniently directed to either the wheels 15 or wheels 16 and the shaft 11 reversed in motion whenever desired. It is

an advantage that when one pair of the wheels are in action their exhaust-steam is not permitted to reach the other pair of wheels, the chambers 13 14 being in this instance rendered independent of each other by the partition 12. The hubs 34 operate as balancing-pistons for the hubs 17 18 in that the steam entering the chambers 22 acts against them in a direction contrary to the direction in which it acts against the said hubs 17 18, whereby the steam is prevented from driving the hubs 17 18 unduly against the partition 12. The hubs 17 18 are of importance in that they permit the proper passage of the steam to the wheels or rotary members of the engine and avoid any necessity for weakening the shaft 11 by forming steam-passages in it.

The wheels 15 16 of the construction described are comparatively simple in structure and inexpensive of manufacture and they are highly efficient in action, their series of discharge ports and nozzles resulting in efficiency and economy.

I do not limit my invention to the employment of two wheels or rotary members 15 in the chamber 13 and two wheels or rotary members 16 in the chamber 14, since the engine would be entirely operative with one right-hand wheel in the chamber 13 and one left-hand wheel in the chamber 14.

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

1. The turbine-engine comprising an exterior casing forming the chambers 13, 22, the shaft extending through said casing and chambers, the hub on said shaft containing the series of longitudinal passages and transverse ports for the steam, a balancing-piston 34 on said hub within said chamber 22 and separated by a space from the inlets to said passages, an inlet for steam to said space wherein it may act against said balancing-piston, and a rotary member on said hub within said chamber 13 to receive the steam from said passages and ports, said piston 34 closely fitting within the outer portion of the chamber 22 and having at its outer face a packing-ring 35 in engagement with the adjacent inner end wall of said chamber 22; substantially as set forth.

2. The turbine-engine comprising the exterior casing subdivided into chambers, the shaft extending through said casing and chambers, a right-hand rotary driving member on said shaft in one of said chambers, a left-hand rotary driving member on said shaft in the other of said chambers, suitable exhausts from said chambers, inlets for steam to said rotary members, and balancing-pistons connected with said rotary members and exterior thereto and between which and said rotary members the steam is admitted; substantially as set forth.

3. The turbine-engine comprising the exterior casing forming adjacent chambers 13, 22, the shaft extending through said chambers, a rotary driving member on said shaft in said chamber 13, a suitable exhaust from said chamber, an inlet for steam leading to said rotary member, and a balancing-piston 34 connected with said rotary member and exterior thereto and between which and said rotary member the steam is admitted, said balancing-piston 34 closely fitting within the outer portion of said chamber 22 and having at its outer face a packing-ring 35 in engagement with the adjacent inner end wall of said chamber 22; substantially as set forth.

4. The turbine-engine comprising the exterior casing subdivided into chambers, the shaft extending through said casing and chambers, hubs keyed on said shaft within said chambers and having inlet-passages and ports for the steam, a right-hand rotary driving member having a hub keyed on one of said hubs and containing inlets in communication with the ports thereof, a left-hand rotary driving member keyed on the other one of said shaft-hubs and containing inlets in communication with the ports thereof, suitable exhausts from said chambers, and suitable means for applying steam to the passages in said shaft-hubs; substantially as set forth.

5. The turbine-engine comprising the exterior casing forming a chamber, the shaft extending through said chamber, a hub fastened on said shaft within said chamber and having a series of longitudinal passages and transverse ports for the steam, a rotary driving member having a hub fastened on said shaft-hub and containing inlets in communication with the ports thereof, and means for supplying steam to said passages at the end thereof; substantially as set forth.

6. The turbine-engine comprising the shaft and rotary driving member therefor, said member comprising the side disks, the annular flange between said disks and therewith forming a steam-chamber, the outlet-ports in said flange, the discharge-nozzles carried by said rotary member in communication with said ports, and means for supplying the steam to said chamber; substantially as set forth.

7. The turbine-engine comprising the shaft and rotary driving member therefor, said member comprising the side disks, the annular flange between said disks and therewith forming a steam-chamber, the outlet-ports in said flange, the discharge-nozzles carried by said rotary member in communication with said ports, the hub on said shaft and upon which said rotary member is mounted, and means for supplying the steam through said hub and to said chamber; substantially as set forth.

8. The turbine-engine comprising the shaft and rotary driving member therefor, said

member comprising the side disks, the annular flange between said disks and therewith forming a steam-chamber, the outlet-ports in said flange, the discharge-nozzles carried by said rotary member in communication with said ports, the hub on said shaft and upon which said rotary member is mounted, and the passages and ports in said hub and communicating with said chamber for supplying the steam thereto; substantially as set forth.

9. The turbine-engine comprising the shaft and rotary driving member therefor, said member comprising the side disks, the annular flange between said disks and therewith forming a steam-chamber, the outlet-ports in said flange, the discharge-nozzles carried by said rotary member in communication with said ports, the hubs on said disks, the hub of one disk extending through the other disk and receiving the hub thereof, and means for supplying the steam to said chamber; substantially as set forth.

10. The turbine-engine comprising the exterior casing subdivided into chambers, the shaft extending through said casing and chambers, a right-hand rotary driving member on said shaft in one of said chambers, a left-hand rotary driving member on said shaft in the other of said chambers, said rotary members each comprising the side disks, the annular flange between said disks and therewith forming a steam-chamber, the outlet-ports in said flange, and the discharge-nozzles carried by said rotary member in communication with said ports; substantially as set forth.

11. The turbine-engine comprising the exterior casing subdivided into chambers, the shaft extending through said casing and chambers, hubs on said shaft within said chambers and having passages and ports for the steam, a right-hand rotary driving member on one of said hubs and in communication with the ports thereof, a left-hand rotary driving member on the other one of said hubs and in communication with the ports thereof, suitable exhausts from said chambers, and suitable means for supplying steam to the passages of said hubs, said rotary members each comprising the side disks, the annular flange between said disks and therewith forming a steam-chamber, the outlet-ports in said flange, and the discharge-nozzles carried by said rotary member in communication with said ports; substantially as set forth.

Signed at New York, in the county of New York and State of New York, this 20th day of June, A. D. 1904.

JOHN A. GROSHON.

Witnesses:

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ARTHUR MARION.