

No. 816,487.

PATENTED MAR. 27, 1906.

D. LUMGAIK.
STEAM TURBINE.

APPLICATION FILED SEPT. 21, 1905.

FIG. 1

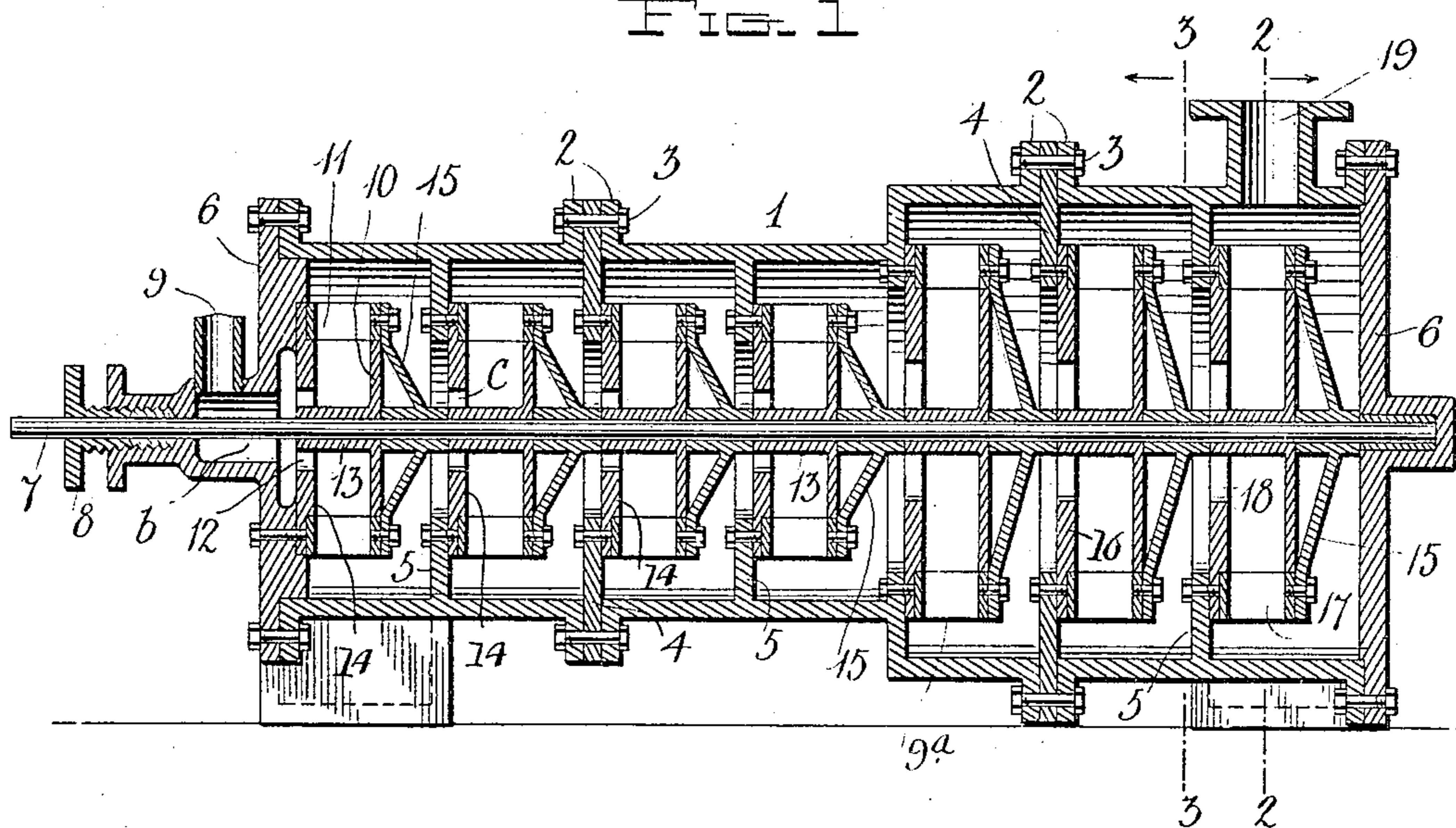


FIG. 2

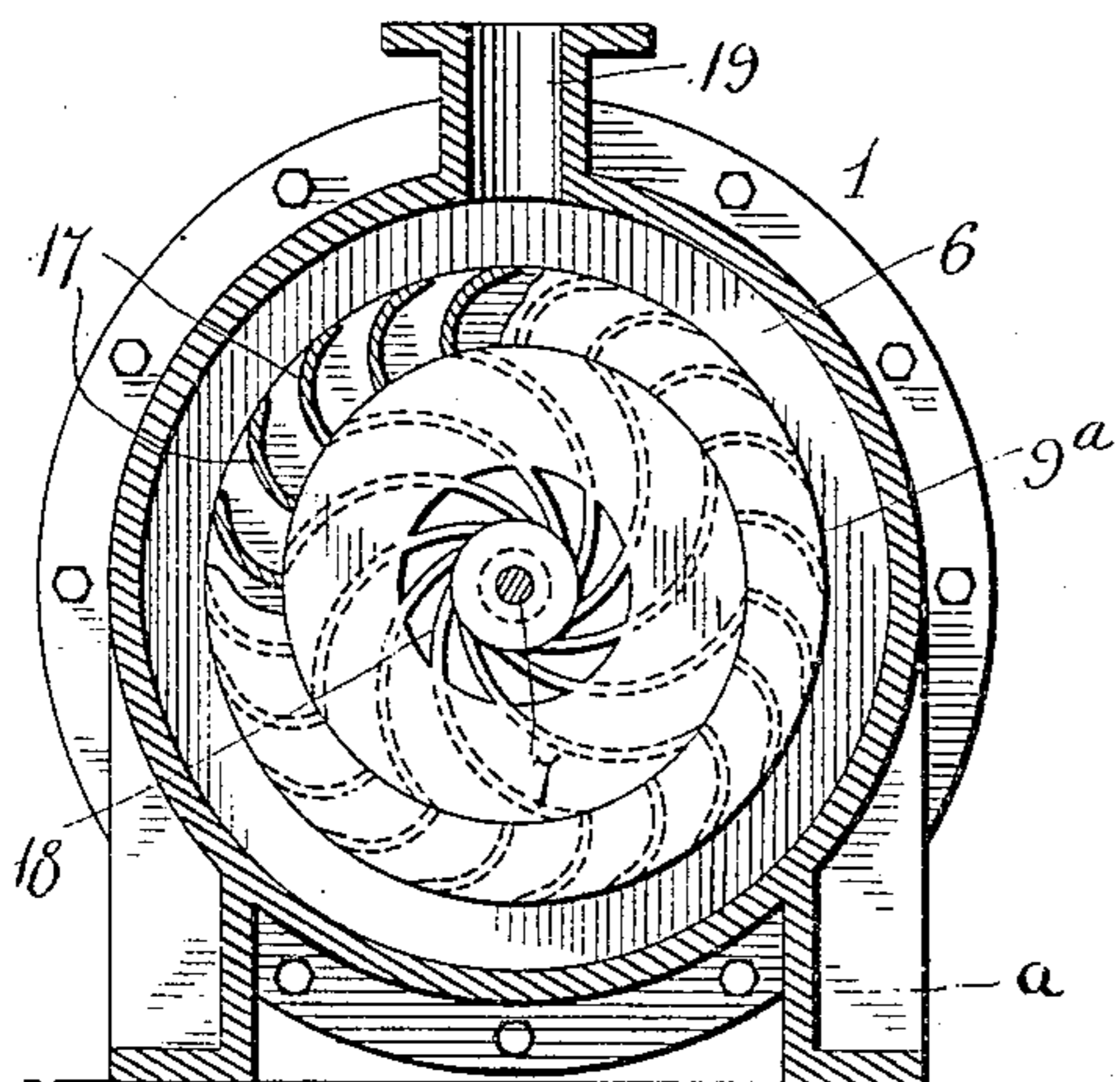
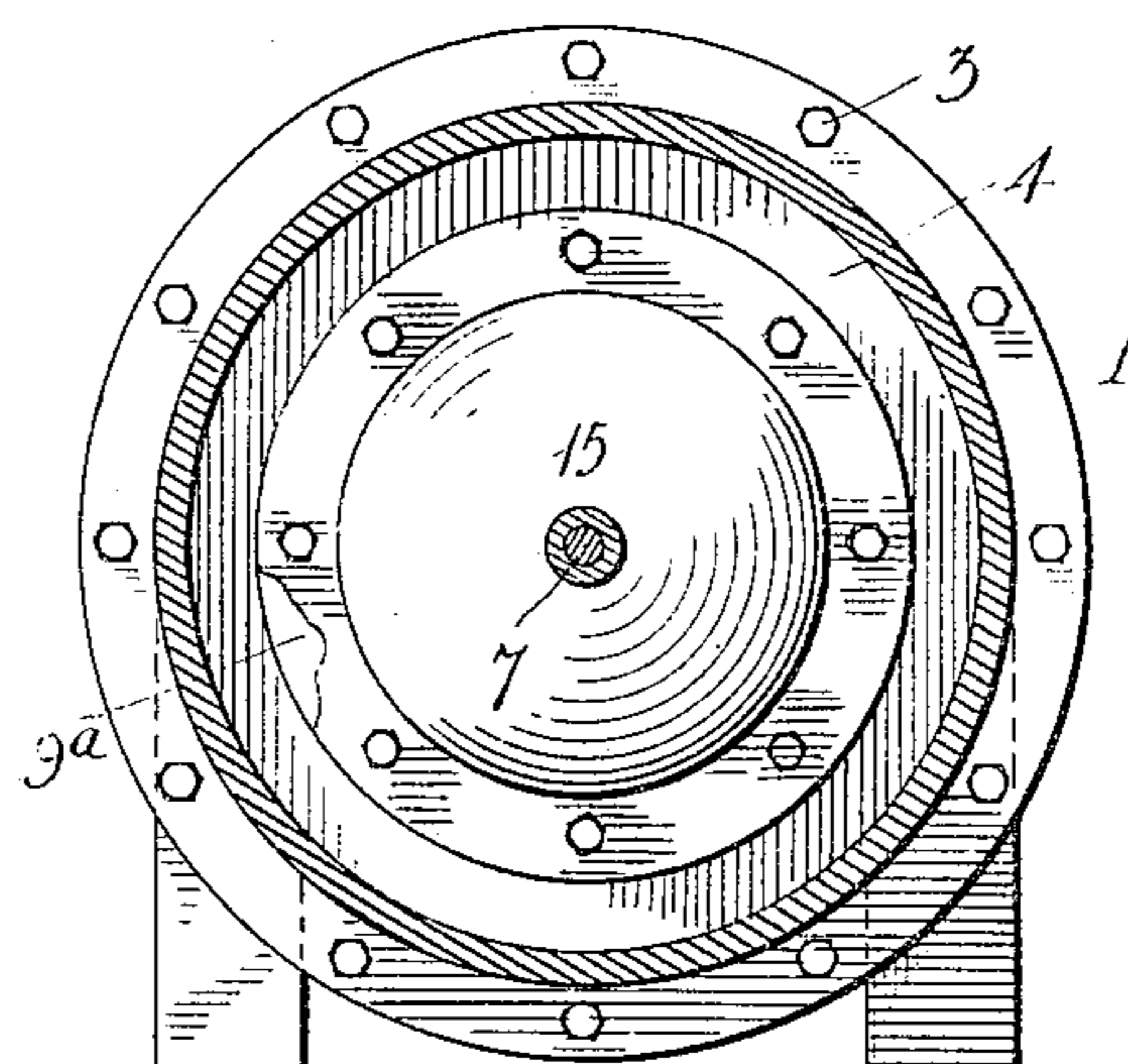


FIG. 3



Witnesses
J. B. Brown
C. H. Griesbauer.

Inventor
David Lumgair
by A. B. Wilson
Attorney

UNITED STATES PATENT OFFICE.

DAVID LUMGAIR, OF WEST BAY CITY, MICHIGAN, ASSIGNOR OF ONE-HALF
TO JACOB P. BENDER, OF BAY CITY, MICHIGAN.

STEAM-TURBINE.

No. 816,487.

Specification of Letters Patent.

Patented March 27, 1906.

Application filed September 21, 1905. Serial No. 279,418.

To all whom it may concern:

Be it known that I, DAVID LUMGAIR, a citizen of the United States, residing at West Bay City, in the county of Bay and State of Michigan, have invented certain new and useful Improvements in Steam-Turbines; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to steam-turbines; and one of the principal objects of the same is to provide a rotary engine of this type which shall be simple in construction and efficient in operation and which will utilize the steam primarily by impact and secondarily by expansion and in this way utilizing the entire force of the steam.

Another object is to provide a compound steam-turbine of simple construction with a series of bucketed wheels of different sizes and to admit the steam progressively from one end to the other of the series to secure both the impact and expansive forces of said steam.

These and other objects are attained by means of the construction illustrated in the accompanying drawings, in which—

Figure 1 is a horizontal longitudinal section of a steam-turbine made in accordance with my invention. Fig. 2 is a vertical sectional view on the line 2 2 of Fig. 1, and Fig. 3 is a similar view on the line 3 3 of Fig. 1.

Referring to the drawings for a more particular description of my invention, the numeral 1 designates the cylinder or casing, which is preferably and as shown composed of a series of sections bolted together at suitable intervals by means of flanges 2, bolts 3, intermediate rings 4, and integral internal flanges 5, as shown in Fig. 1. This cylinder or casing is closed at its opposite ends by means of the cylinder-heads 6, and a shaft 7 passes through these heads, which are provided with suitable stuffing-boxes 8. In one of the cylinder-heads is an inlet-opening 9 to receive live steam from any suitable source. Within the casing and mounted to rotate on the shaft 7 are a series of turbine-wheels 15, provided with curved buckets 11. Openings 12 near the axis of the wheel communicate with the buckets 11 through the curved opening 18, Fig. 2. These turbine-wheels consist of disks 15, secured to a hub mounted to ro-

tate upon the shaft 7. Between the hubs of the wheels are disposed sleeves or hubs 13, which serve to space the wheels apart. Guides 14 for the wheels are secured to the internal flanges 5 of the casing and to the rings 4 between the sections of the casing, as shown. These guides, in connection with the hubs 13, serve to prevent the wheels from moving longitudinally upon the shaft and to insure a smooth regular action of the wheels. The spokes or webs are bolted to the buckets, as shown. A series of larger turbine-wheels 9^a to receive the expanded steam are arranged in the larger portion of the casing and mounted upon the shaft 7 in a manner similar to the wheels 10. Guides 16 are also secured in a manner similar to those already described. As shown in Fig. 2, these larger turbine-wheels are provided with a series of buckets 17 and curved openings 18, which lead to the buckets. An exhaust-port 19 is provided in the casing 1 at the end opposite the inlet-port. The casing is adapted to rest upon legs *a* of any suitable construction. Upon reference to Fig. 1 it will be understood that the steam enters the inlet-port 9 and passes through opening *b* and into one of the turbine-wheels 10 through the curved openings, where the steam acts by impact upon the blades or buckets 11 thereof, passing radially out through the wheel and around and down through the opening *c* into the next adjoining turbine, and thence continues radially upward and outward to the next wheel, and so on through the series, gradually expanding and exerting its force upon the wheels near the exhaust end by expansion, and finally passing out through the exhaust-opening, where it may be taken and passed to another series of wheels or to the atmosphere, if desired.

Various changes in the form, proportion, and the minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of the invention.

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

1. A steam-turbine comprising a casing made in sections having external and internal flanges, said sections being bolted together and having rings secured between the external section-flanges and extending into the cas-

ing, a series of guides secured to said internal flanges and rings and provided with openings, a series of turbine-wheels mounted upon a shaft within said casing, buckets on said
5 wheels, an inlet-port at one end of said casing, and an exhaust-port at the opposite end, substantially as described.

2. In a compound steam-turbine consisting of sections having internal and external
10 flanges, guides secured to the internal flanges, rings secured to the external flanges and guides secured thereto, a shaft extending through said casing, a series of impact tur-

bine-wheels mounted upon said shaft within said casing, a series of larger steam-turbine 15 wheels secured to said shaft within said casing, a live-steam-inlet pipe at one end of said casing, and an exhaust-port at the opposite end thereof, substantially as described.

In testimony whereof I have hereunto set 20 my hand in presence of two subscribing witnesses.

DAVID LUMGAIR.

Witnesses:

FRED NEUMANN,

THOMAS D. CAMPBELL.