No. 768,433. PATENTED AUG. 23, 1904.

T. EASTMOORE & M. M. FREED.

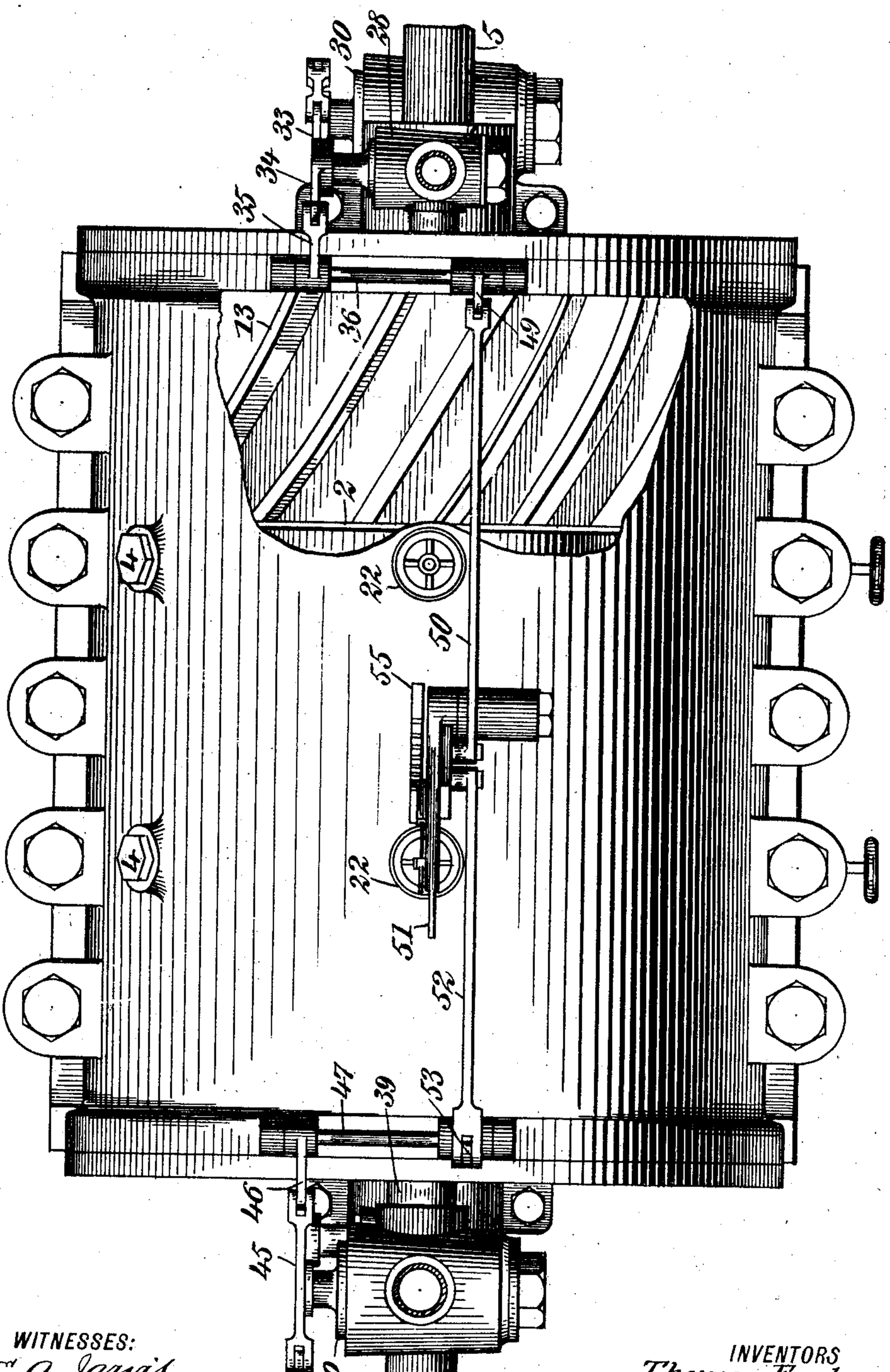
TURBINE.

APPLICATION FILED APR. 7, 1904.

NO MODEL.

3 SHEETS—SHEET 1.

FIG. 1.



WITNESSES:
C. A. Jarvis.
C. R. Ferguson

INVENTORS
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ATTORNEYS

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NO MODEL. 3 SHEETS—SHEET 2.

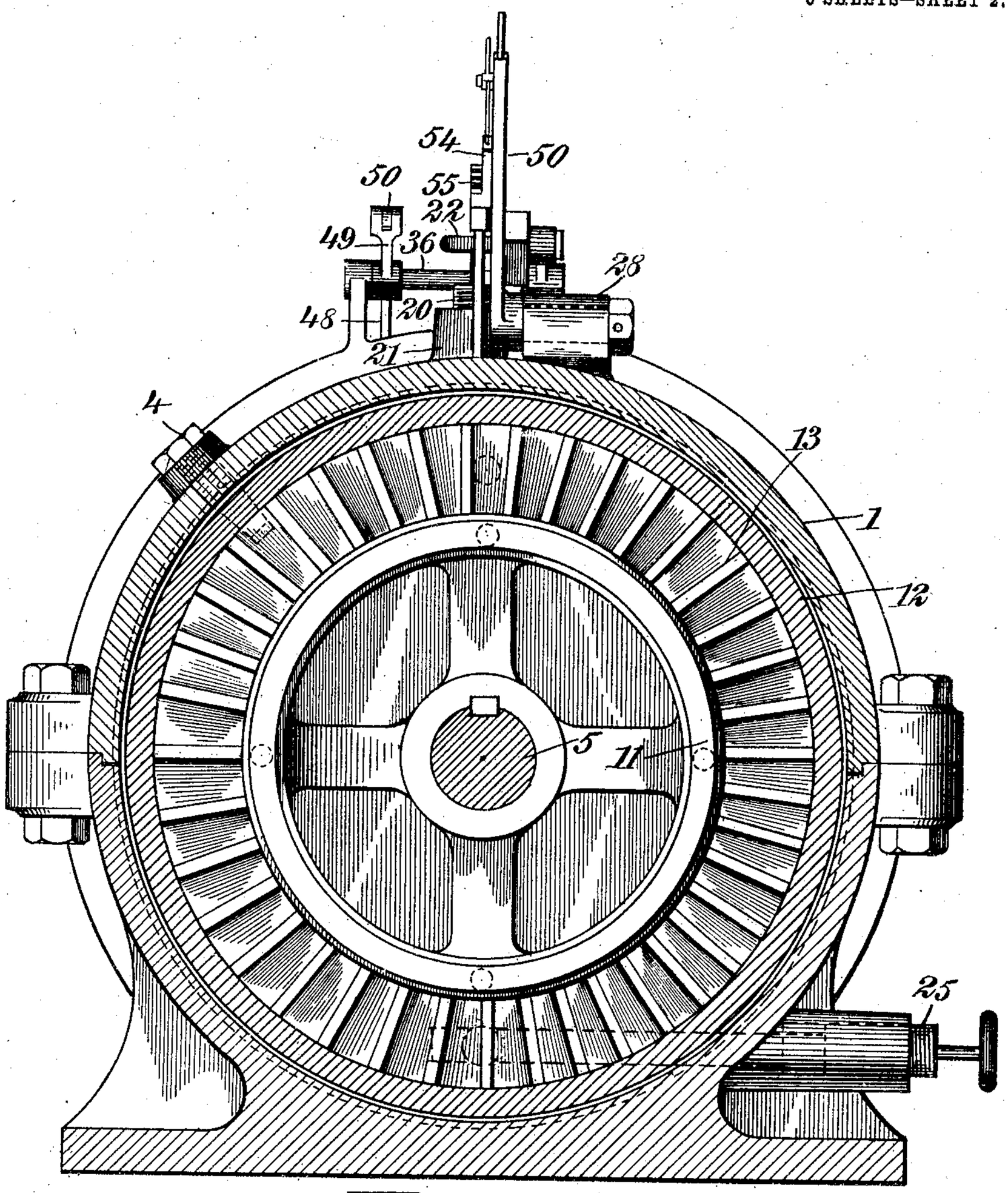

FIG. 2.

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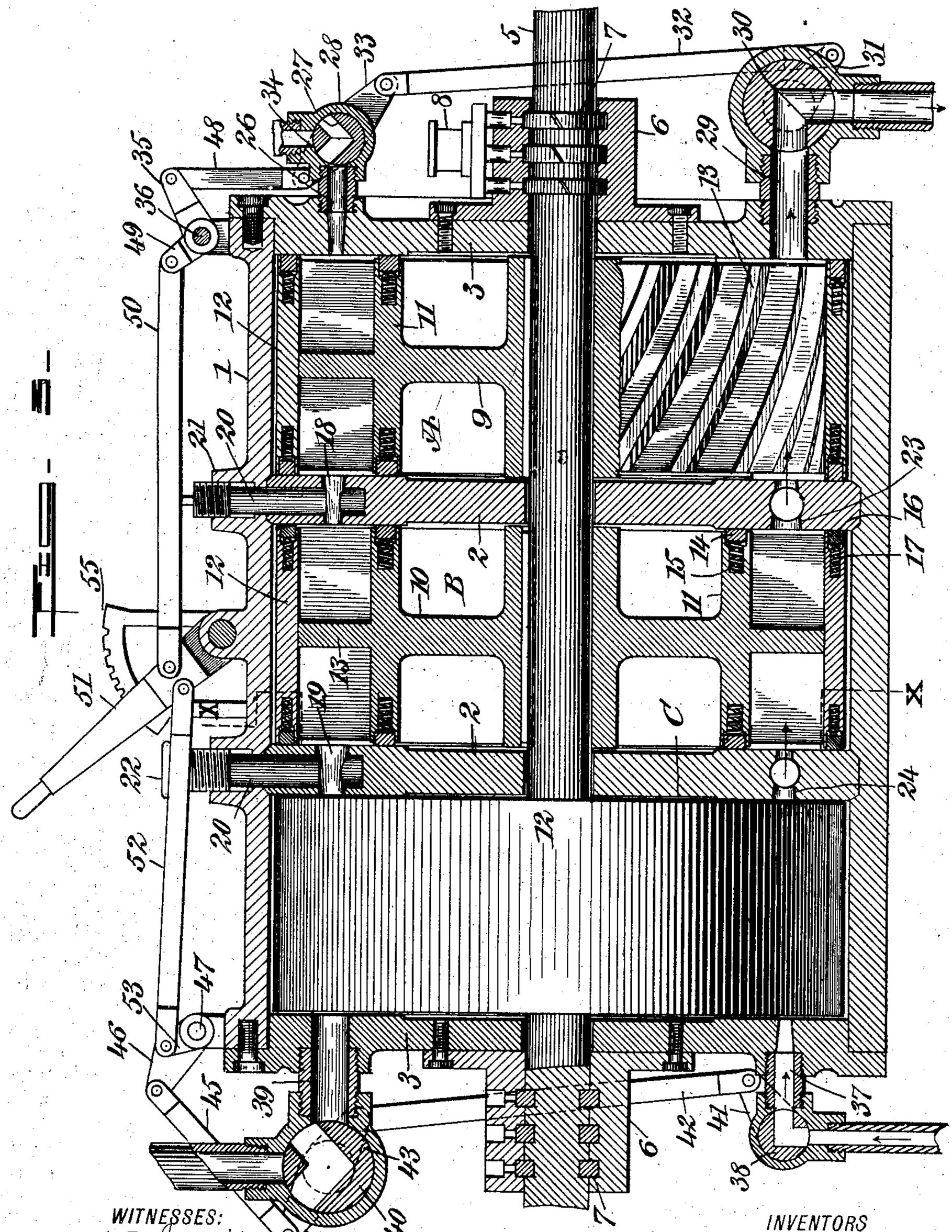
NO MODEL. 3 SHEETS—SHEET 3.



INVENTORS
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No. 768,433. Patented August 23, 1904.

UNITED STATES PATENT OFFICE.

THOMAS EASTMOORE AND MATHEW M. FREED, OF JACKSONVILLE, FLORIDA.

TURBINE.

SPECIFICATION forming part of Letters Patent No. 768,433, dated August 23, 1904.

Application filed April 7, 1904. Serial No. 202,032. (No model.)

To all whom it may concern:

Be it known that we, THOMAS EASTMOORE and MATHEW M. FREED, both citizens of the United States, and residents of Jacksonville, in the county of Duval and State of Florida, have invented a new and Improved Turbine, of which the following is a full, clear, and exact description.

This invention relates to improvements in multiple compound expansion steam-turbines, an object being to provide a machine of this character that will be effective in operation, simple and durable in construction, easily reversed, and arranged to utilize the motive agent to the fullest extent.

We will describe a turbine embodying our invention and then point out the novel features in the appended 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 top plan view, with parts broken away, of a turbine embodying our invention. Fig. 2 is a section on the line *x x* of Fig. 3, and Fig. 3 is a longitudinal vertical section.

The turbine comprises a cylinder 1, divided into a plurality of chambers A B C by means of partitions 2 and the cylinder-heads 3. These partitions 2 may be secured in place by any suitable means. We have here shown the partitions as secured in place by means of bolts 4. Extended through the cylinder-heads and also through the partitions is a power-shaft 5, which has bearings in boxes 6, secured to the heads, these boxes having interior channels to receive packing-rings 7, of gun-metal or the like, and these rings also engage in channels formed in the shaft. Oil-cups 8, mounted on the bearing-boxes, have communication with the several rings. Secured to the shaft within the chamber A is a turbine-wheel 9, a similar wheel 10 being secured to the shaft within the chamber B, and another turbine-wheel is secured to the shaft within the chamber C. These turbine-wheels are of similar construction, and each comprises an inner rim 11 and an outer rim 12, and between the inner and outer rims are spirally-disposed flanges 13, which form the walls of buckets or pockets in the wheels. The inner rims 11 are provided with packing-rings 14, forced outward by means of springs 15, and the outer rims 12 are provided with similar packing-rings 16, forced outward by springs 17.

The partitions 2 are provided at the upper side with ports 18 19, the openings of which are governed by plug-valves 20, having screw-thread engagement in socket members 21 on the cylinder, and the outer ends of the valves are provided with hand-wheels 22. Near the lower side the partitions are provided with ports 23 24, in which valves 25 operate similar to the valves 20. It will be noted that the port 19 is somewhat larger in area than the port 18, so as to permit of the passage of expanded steam readily from the chamber A to the chamber B and from said chamber B to the chamber C when the turbine is rotating in one direction. The lower ports are reversely arranged—that is, the port 23 is somewhat larger than the port 24 to permit the passage of the expanded steam when the wheel is rotating in the reverse direction.

The chamber A has an inlet 26 for live steam, which is controlled by a valve 27 in the valve-casing 28, and at the lower portion the said chamber A has an exhaust-port 29, controlled by a valve 30, on the stem of which is an arm 31, connected to a link 32, the upper end of said link being pivotally engaged with an arm 33, extended from the stem of the valve 27, and also on the stem of said valve is an upwardly-disposed arm 34, which connects with an arm 35, projected from a shaft 36, mounted in bearings on the cylinder. At the opposite end the chamber C has an inlet-port 37, controlled by a valve 38, and an exhaust-port 39, controlled by a valve 40. Connected to the stem of the valve 38 is an arm 41, from which a link 42 extends to a connection with an arm 43 on the stem of the valve 40, and also on this stem is an arm 44, connected, by means of a link 45, with an arm 46 on a shaft 47, mounted to rock in bearings on the cylinder. It will be noted that the arm 34 is connected to the arm 35 through the medium of

a link 48, similar to the link 45. From an arm 49 on the shaft 36 a draw-rod 50 extends to pivotal connection with a reversing-lever 51, and from this reversing-lever 51 a draw-rod 52 extends to a connection with an arm 53 on the shaft 47. The shifting lever 51 is provided with a spring-pressed pawl 54 for engaging with any one of the teeth in a segment-rack 55, so as to hold the valves as adjusted to permit the entrance and exhaust of more or less steam. By this valve-actuating mechanism it is obvious that the direction of rotation of the turbine may be quickly reversed.

As the parts are indicated in Fig. 3, the actuating medium is admitted through the port 37 and passes into the chamber C to operate upon the wheel-section in said chamber, and thence the slightly-expanded steam passes through the port 24 to operate upon the wheel in the chamber B, and thence the expanded steam passes into the chamber A, actuating the wheel-section in said chamber, and thence exhausts through the port 29. As the flanges 13 are diagonally or spirally disposed, it is obvious that the motive agent will act by pressure or impact throughout their entire length.

Having thus described our invention, we claim as new and desire to secure by Letters Patent—

1. A turbine comprising a cylinder having heads and partitions dividing the cylinder into a plurality of chambers, a shaft extended through the cylinder, turbine-wheel sections mounted on the shaft within the chambers, each wheel-section comprising an inner rim and an outer rim, spirally-disposed flanges arranged between the inner and outer rims, and ports in the heads and partitions for directing steam through the several chambers.

2. A turbine comprising a cylinder, partitions arranged in the cylinder, headers for the cylinder, the said headers and partitions forming walls of chambers in the cylinder, a shaft extended through the headers and through the partitions, turbine-wheel sections mounted on the shaft in the chambers, valve-controlled inlet and outlet ports in the headers, valve-controlled ports leading through the partitions, and means for simultaneously operating the valves in the first-named ports.

3. A turbine comprising a cylinder, headers for the cylinder, partitions arranged in the cylinder and having ports, the said headers also having ports, screw-valves for controlling the ports in the partitions, plug-valves for controlling the ports in the headers, and means for simultaneously reversing the several plug-valves.

4. A turbine comprising a cylinder, a shaft extended through the cylinder, a turbine-wheel mounted on the shaft and divided into a plurality of sections, an exhaust-port leading through each header, an inlet-port leading through each header, valves for controlling the ports, link connections between the valves at each end of the cylinder, rock-shafts supported on the cylinder at each end, arms extended from the rock-shafts, link connections between said arms and the inlet-controlling valve at one end and the exhaust-controlling valve at the other end, a reversing-lever, and rods connecting said reversing-lever with said shafts.

5. A turbine comprising a cylinder, heads for the cylinder provided with inlet and outlet ports, partitions arranged in the cylinder and having valve-controlled ports, a shaft extending through the cylinder-heads and partitions, turbine-wheel sections mounted on the shaft, valves for controlling the inlet and outlet ports in the cylinder-heads, and means for simultaneously reversing the said valves.

6. A turbine comprising a cylinder having heads and partitions dividing the cylinder into a plurality of chambers, a shaft extending through the cylinder, turbine-wheel sections mounted on the shaft within the chambers, each of said wheel-sections comprising an inner rim, an outer rim and spirally-disposed flanges arranged between the rims, each of said partitions being provided with valve-controlled ports located near the top and bottom of the partition, respectively, and connecting the adjacent chambers, the end chambers of the cylinder each having an inlet and an exhaust port, valves controlling the said inlet and exhaust ports, a reversing-lever, and connecting means between the said lever and the several inlet and exhaust values for simultaneously reversing the same.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

THOMAS EASTMOORE.
MATHEW M. FREED.

Witnesses:
C. R. FERGUSON,
JNO. M. RITTER.