No. 775,315. PATENTED NOV. 22, 1904.

C. N. SCHOTTMULLER.

TURBINE.

APPLICATION FILED APR. 5, 1904.

NO MODEL. 5 SHEETS—SHEET 1.

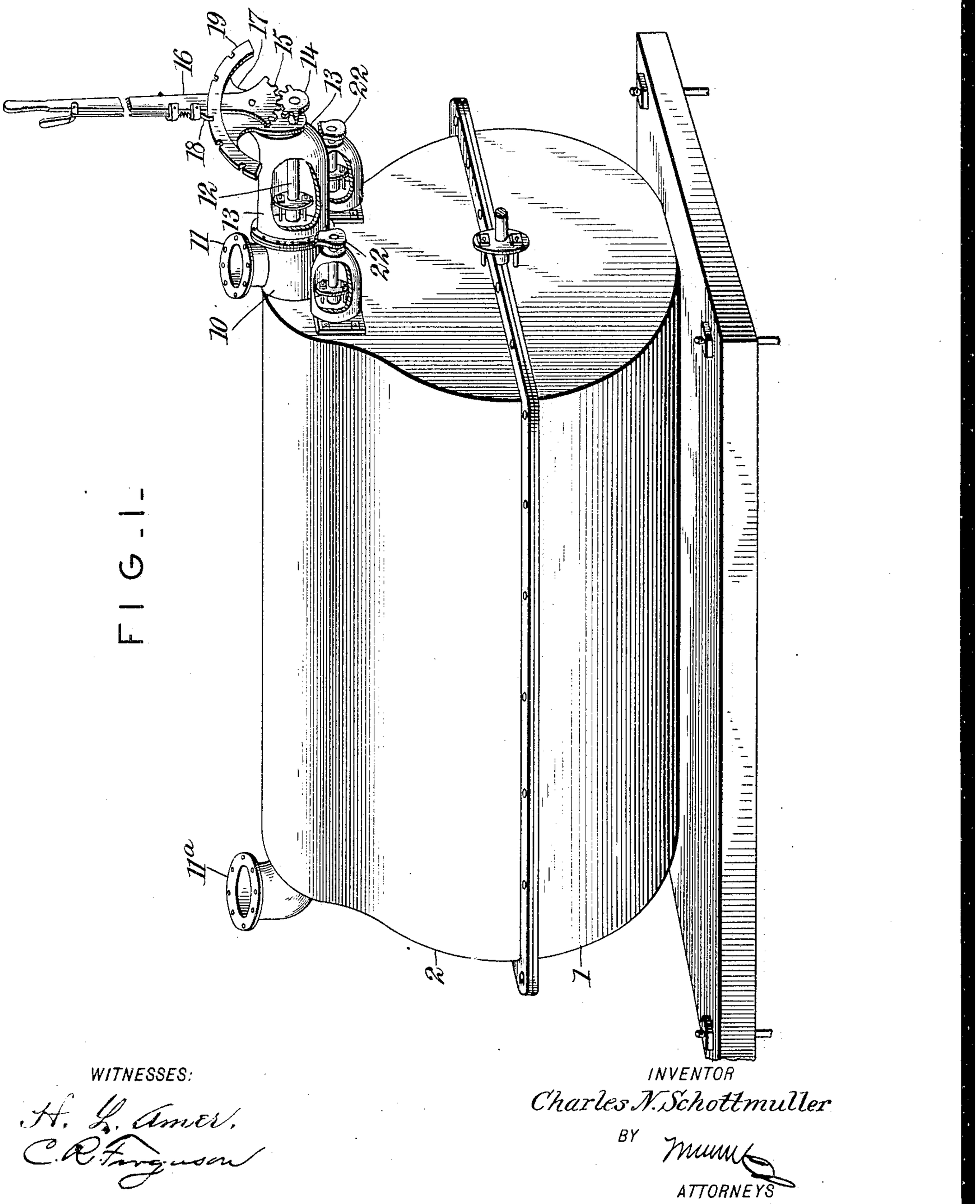

FIG. 1.

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C. R. Ferguson

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ATTORNEYS

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NO MODEL. 5 SHEETS—SHEET 2.

FIG. 3.

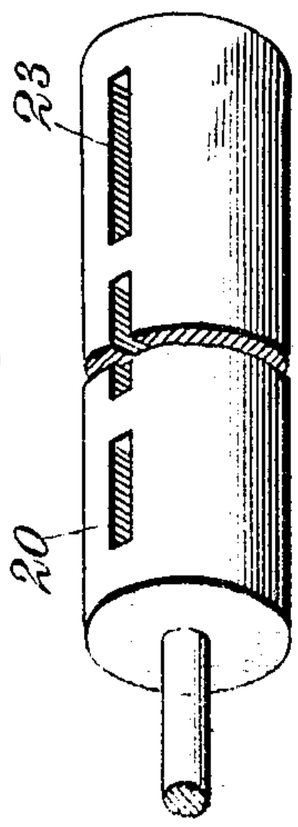


FIG. 4.

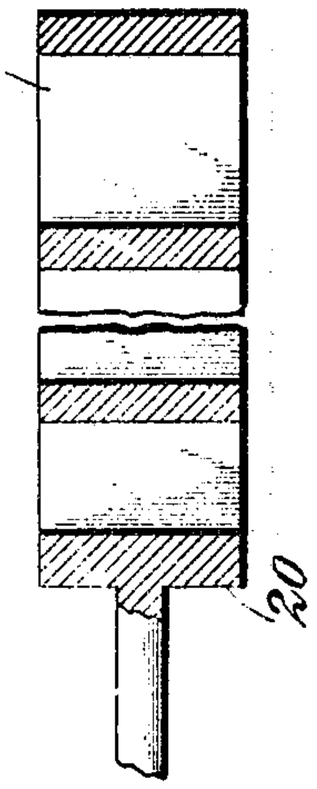


FIG. 5.

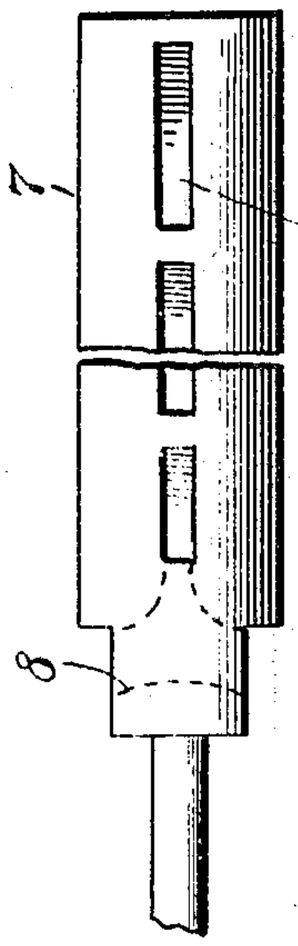


FIG. 6.

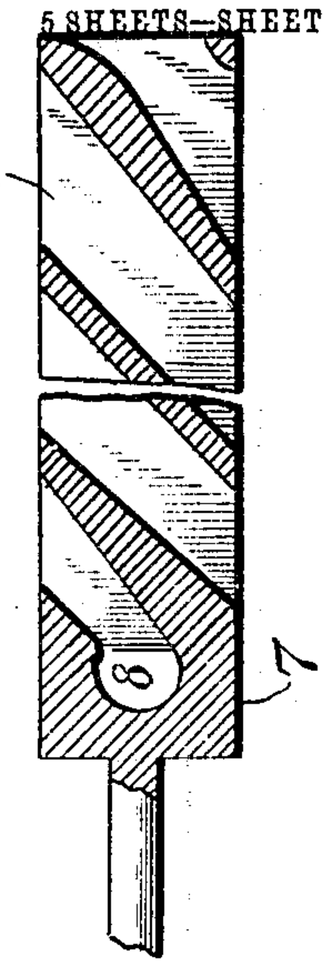


FIG. 2.

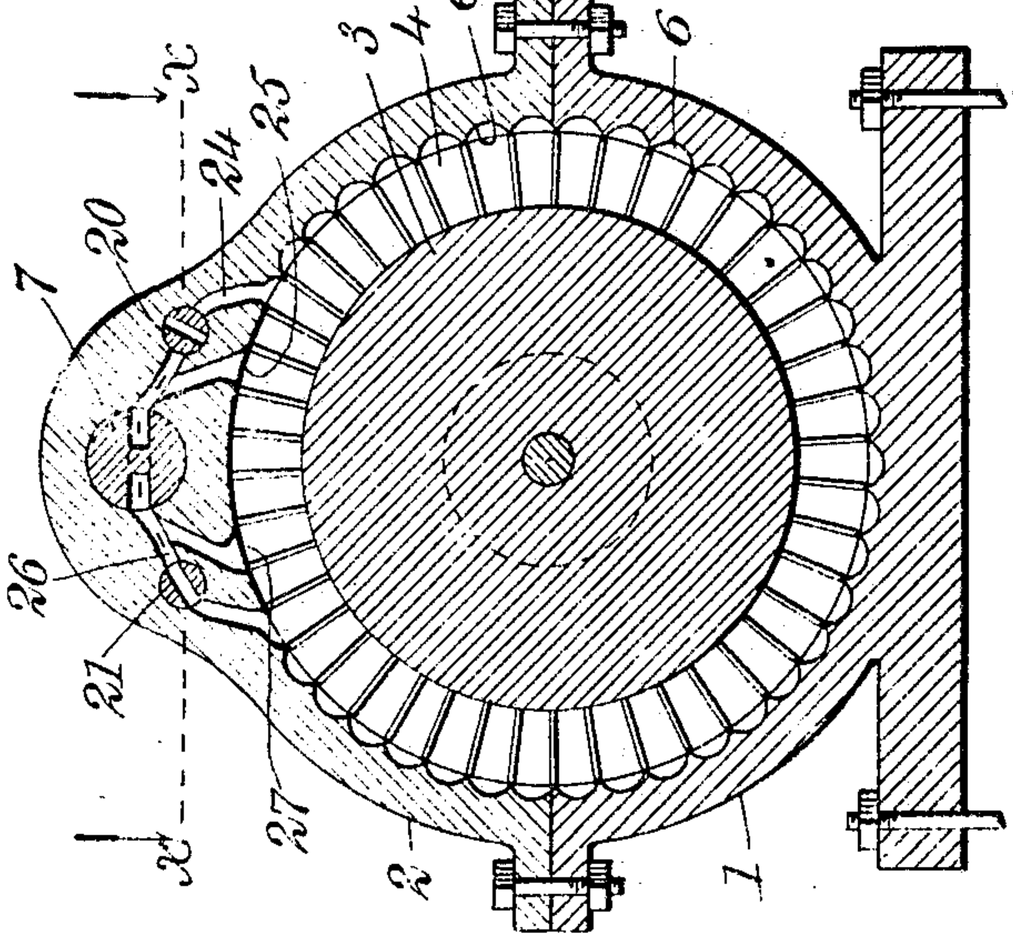


FIG. 8.

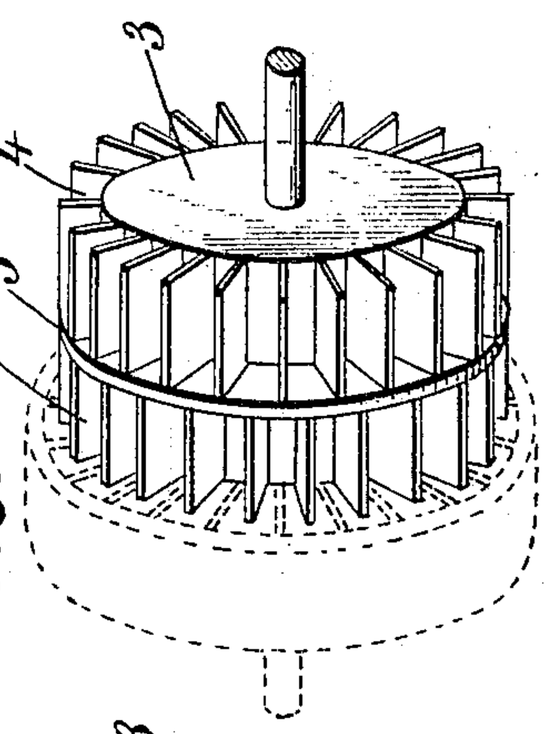
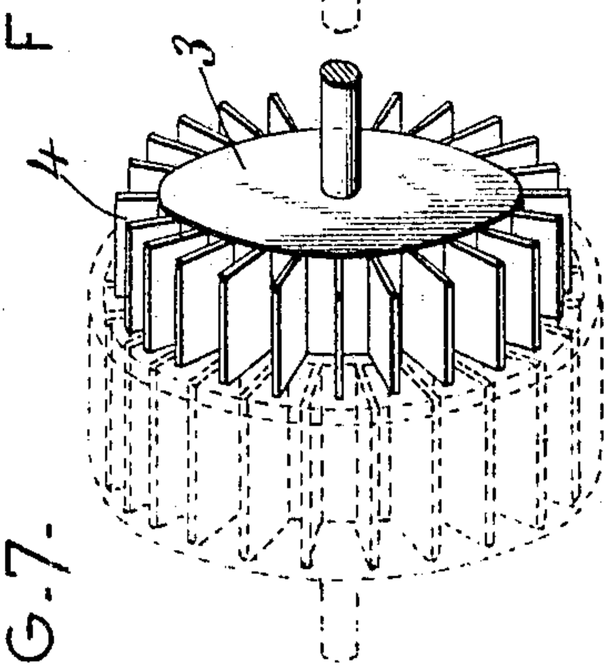


FIG. 7.



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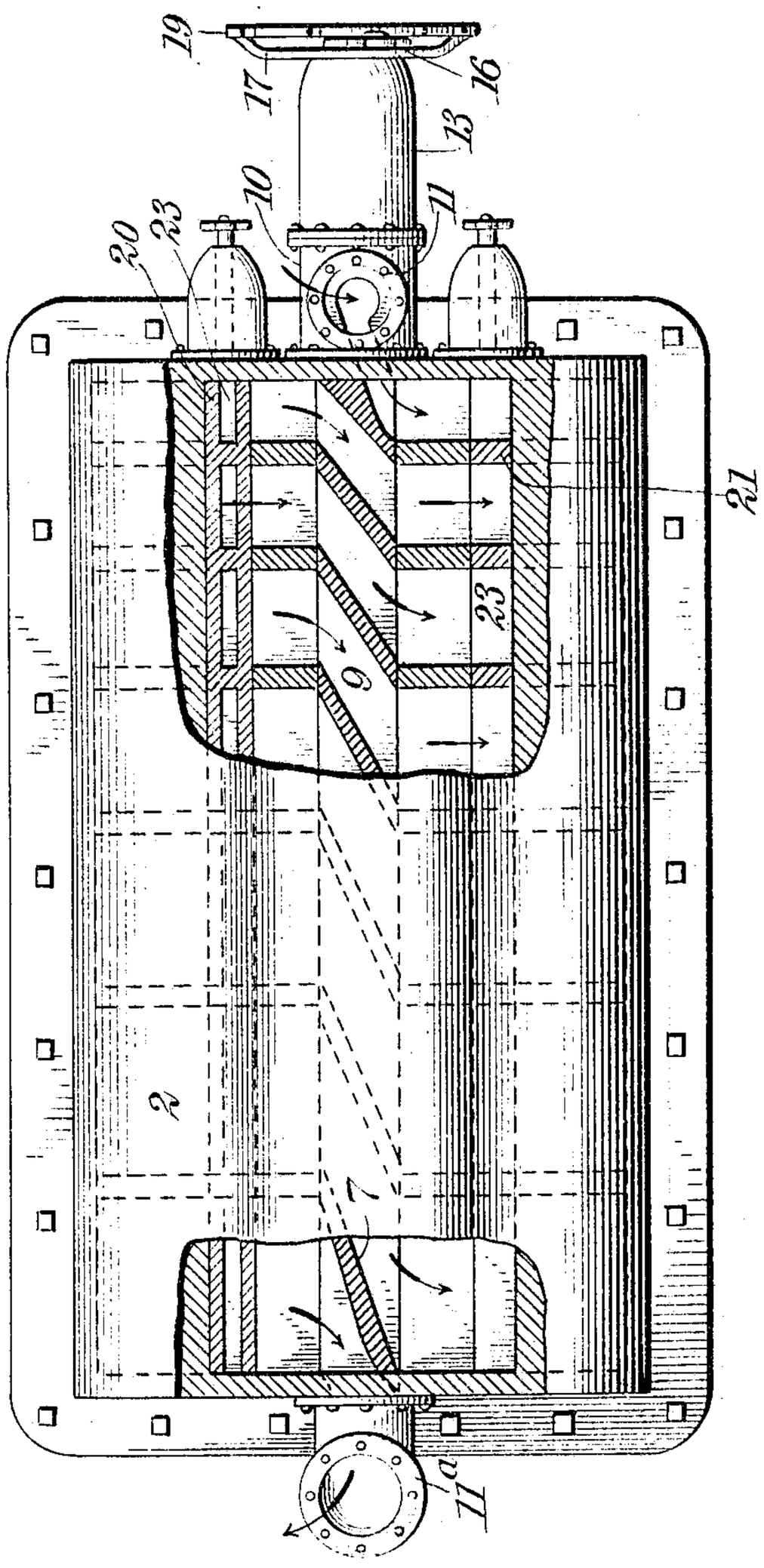
NO MODEL. 5 SHEETS—SHEET 3.

FIG. 9.



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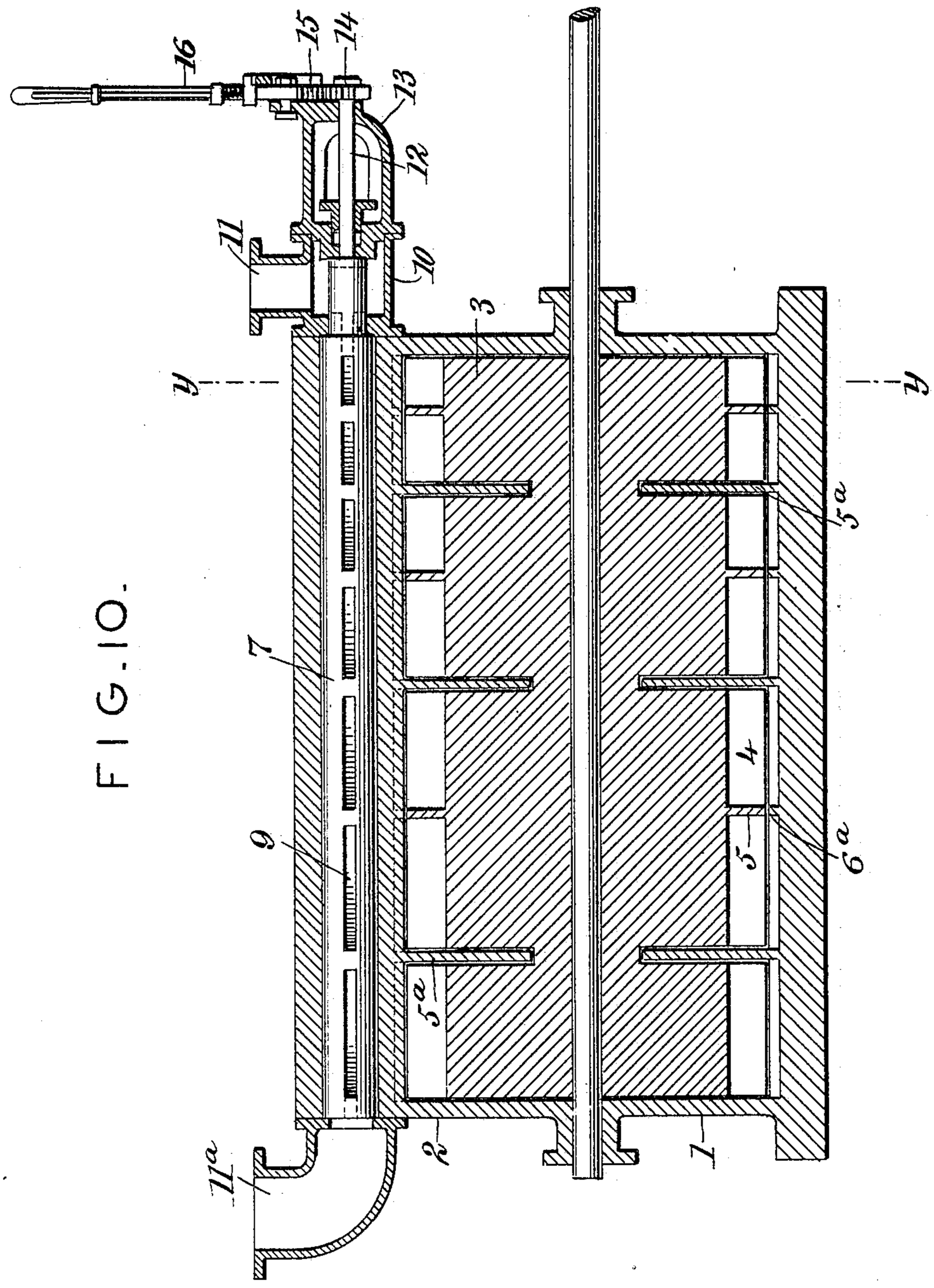
NO MODEL. 5 SHEETS—SHEET 4.

FIG. 10.



WITNESSES:

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No. 775,315. PATENTED NOV. 22, 1904.

C. N. SCHOTTMULLER.

TURBINE.

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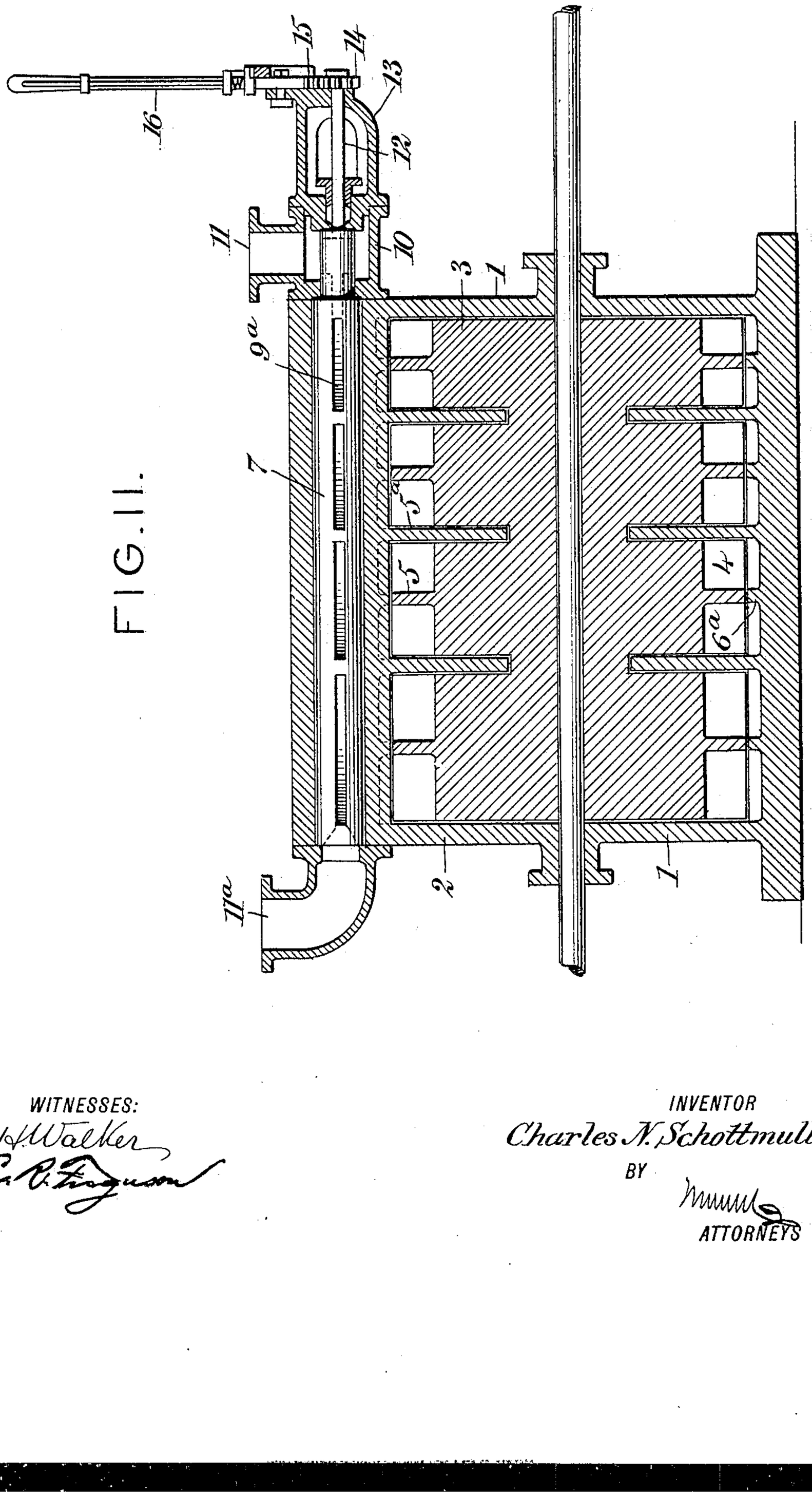
NO MODEL. 5 SHEETS—SHEET 5.

FIG. II.



WITNESSES:

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No. 775,315. Patented November 22, 1904.

UNITED STATES PATENT OFFICE.

CHARLES N. SCHOTTMULLER, OF TAYLORS FALLS, MINNESOTA.

TURBINE.

SPECIFICATION forming part of Letters Patent No. 775,315, dated November 22, 1904.

Application filed April 5, 1904. Serial No. 201,652. (No model.)

To all whom it may concern:

Be it known that I, CHARLES N. SCHOTTMULLER, a citizen of the United States, and a resident of Taylors Falls, in the county of Chisago and State of Minnesota, have invented a new and Improved Turbine, of which the following is a full, clear, and exact description.

This invention relates to improvements in steam-turbines, an object being to provide a motor of this type that may be operated in either direction with an economical use of steam.

I will describe a turbine embodying my 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 perspective view of a steam-turbine embodying my invention. Fig. 2 is a cross-section thereof on the line *y y* of Fig. 10. Fig. 3 is a perspective view of one of the exhaust-valves. Fig. 4 is a longitudinal section thereof. Fig. 5 is a plan view of the controlling reversing-valve employed. Fig. 6 is a longitudinal section of the same. Figs. 7 and 8 are perspective views of portions of the turbine-piston. Fig. 9 is a plan view of the turbine, partly in section on the line *x x* of Fig. 2. Fig. 10 is a vertical longitudinal section of the turbine, and Fig. 11 is a vertical longitudinal section showing a modification.

The turbine comprises a casing consisting of a lower section 1 and an upper section 2, the sections being secured together, so as to form a cylinder. The piston arranged in the cylinder consists of a body 3, having its shaft-bearings in the end walls of the cylinder, and this body 3 throughout its length is provided with a plurality of circumferentially-disposed buckets 4. Each series of buckets 4 is separated from the adjacent series by a partition 5, and, as clearly indicated in Fig. 8, the side walls of the buckets of one series alternate with the side walls of the buckets of the next series. The buckets of the several series are of equal depth; but they gradually increase in width and therefore increase in capacity from the inlet end of the cylinder to the outlet end. This casing and piston are also divided into a plurality of chambers by means of partition-rings 5^a, which alternate with the partitions 5.

The interior of the cylinder is longitudinally-corrugated, as indicated at 6, and the walls of these corrugations form abutments for steam. At the upper portion of the cylinder, however, these corrugations are omitted. The corrugations are divided into sections in each chamber by cross-partitions 6^a, thus holding the steam in the chambers until it shall have done its work. (See Figs. 10 and 11.)

Extended longitudinally through the cylinder-wall is the reversing-valve 7, which at the forward end is provided with a transverse opening 8 for admitting steam to the ports 9, formed transversely in the valve and at an acute angle with relation to the axis of the valve. The object in so forming the ports is to cause the reversing of the engine movement. The end of the valve 7 having the inlet is arranged in a valve-casing 10, into which motive agent is admitted through a pipe 11. The opposite end of the valve 7 has port communication with an exhaust-pipe 11^a. The stem 12 of the reversing-valve extends outward through a casing 13 and is provided at its outer end with a segment-gear 14, engaged by a segment-rack 15 on a lever 16, pivoted to a plate 17, and on this lever 16 is a pawl 18 for engaging in any one of the notches formed in a segment-plate 19, also attached to said plate 17.

Arranged in longitudinal bores formed in the cylinder at opposite sides of the reversing-valve 7 are exhaust-valves 20 21. These exhaust-valves have stems extended outward through the front wall of the cylinder, and attached to the stems are operating-levers 22. Each exhaust-valve is provided with a plurality of transverse ports 23, which, like the ports through the reversing-valve, increase in width from the inlet end to the outlet end. From the longitudinal bore for the reversing-valve an exhaust-port 24 leads into the cylinder, and in this exhaust-port is the exhaust-valve 20, and leading from the port 24 into

the cylinder is an inlet-port 25 for the motive agent. Similar ports 26 27 lead from the opposite side of the bore for the valve 7, and in the port 26 the exhaust-valve 21 is located.

In the operation as the motive agent is admitted it will pass into the first annular series of buckets, causing the piston to rotate, and upon the complete rotation the steam will pass from the first series of buckets through the ports of the open exhaust-valve into the next series of buckets, and this will continue until the steam or other motive agent finally passes out of the exhaust-pipe 11ª. By gradually increasing the area of the buckets and ports allowance is made for expansion. Obviously by imparting a one-half turn to the valve 7 the direction of motion of the piston will be reversed from that shown in Fig. 9, and it will be seen that when reversing the valve 7 the exhaust-valves must also be reversed.

Two or more turbines may be connected together, with condensers attached and operated as compound condensing-engines.

In Fig. 11 the bucket-partitions are located in the center of each section of the turbine, and there is but one port 9ª in the valve 7 for each section. The steam flowing through the valve-port into the first section or chamber engages the two series of the first section at once and after passing through the first chamber passes through the valve into the next chamber, and so on to the exhaust.

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

1. In a turbine, a casing, a cylindrical piston in the casing and having a plurality of circumferential rows of buckets, a reversing-valve for directing motive agent into the buckets, and exhaust-valves at opposite sides of the reversing-valve.

2. A steam-turbine comprising a casing, or cylinder, a piston mounted to rotate therein, a plurality of separated circumferentially-disposed buckets on the piston, the walls of the buckets of one row alternating with the walls of the buckets of the adjacent row, a reversing-valve mounted to rotate in the wall of the casing and having diagonally-disposed ports, and exhaust-valves extended throughout the length of the casing at opposite sides of the reversing-valve, the said exhaust-valves having transverse ports.

3. A steam-turbine comprising a casing, a piston mounted to rotate therein, a series of circumferentially-disposed buckets in the piston, the area of the buckets in a series increasing from the inlet end to the outlet end, a reversing-valve mounted to rotate in the casing and having diagonally-disposed ports increasing from the inlet end to the outlet end, and exhaust-valves at opposite sides of the reversing-valve, the said exhaust-valves having transverse ports increasing in width from the inlet to the outlet end.

4. In a steam-turbine, a casing longitudinally corrugated in its inner side, a piston mounted to rotate in the casing, a plurality of annular rows of buckets carried by the piston, the several rows being separated one from another, a reversing-valve mounted to rotate in the wall of the casing and having diagonally-disposed ports, exhaust-ports leading from the bore for the reversing-valve into the casing, motive-agent ports leading from the exhaust-ports into the casing, and valves for controlling the exhaust-ports.

5. A steam-turbine comprising a casing, a piston mounted to rotate therein and having a series of annular rows of buckets, a reversing-valve mounted to rotate in the wall of the casing and having diagonally-disposed ports, a gear mechanism for imparting rotary motion to the valve, and exhaust-controlling valves at opposite sides of the reversing-valve.

6. A steam-turbine comprising a casing having longitudinal corrugations in its inner side, a piston mounted to rotate in the casing and having a plurality of annular rows of buckets, the several rows of buckets increasing in area from the inlet end to the outlet end, a rotary valve extended lengthwise through the wall of the casing and having diagonally-disposed ports increasing in area from the inlet to the outlet end, inlet and exhaust ports leading from the said valve into the casing, exhaust-controlling valves extended through the wall of the casing and through said exhaust-ports, an inlet-pipe for motive agent communicating with the inlet end of the first-named valve, and an exhaust-pipe communicating with the outlet end thereof.

7. In a turbine, a casing separated into chambers, the chamber-walls setting into the piston-body inward of the plane of the buckets, a cylindrical piston divided into sections having a plurality of circumferential rows of buckets, each section occupying a chamber in the casing, a reversing-valve for directing motive agent into the buckets, and exhaust-valves at opposite sides of the reversing-valve.

8. In a steam-turbine, a casing or cylinder separated into chambers, a piston divided into sections, mounted to rotate therein, each section occupying a chamber in the casing, a plurality of separated circumferentially-disposed buckets on the piston, the walls of the buckets of one row alternating with the walls of the buckets of the adjacent row, a reversing-valve mounted to rotate in the wall of the casing and having diagonally-disposed ports, and exhaust-valves extended throughout the length of the casing at opposite sides of the reversing-valve, the said exhaust-valves having transverse ports.

9. A steam-turbine comprising a casing separated into chambers, a piston divided into sections, mounted to rotate therein, a series of circumferentially-disposed buckets on the piston, each section occupying one chamber in

the casing, the area of the buckets in a series increasing from the inlet end to the outlet end, a reversing-valve mounted to rotate in the casing, and having diagonally-disposed ports increasing in width from the inlet end to the outlet end, and exhaust-valves at opposite sides of the reversing-valve, the said exhaust-valves having transverse ports increasing in width from the inlet end to the outlet end.

10. In a steam-turbine, a casing separated into chambers, each chamber having longitudinal corrugations on its inner side, said corrugations being divided in the center circumferentially by a partition, a piston separated into sections, mounted to rotate in the casing, each section occupying a separate casing-chamber, a plurality of annular rows of buckets carried by the piston, two annular rows of buckets completing a section, the several rows being separated one from another, a reversing-valve mounted to rotate in the wall of the casing, and having diagonally-disposed ports, exhaust-ports leading from the bore of the reversing-valve into the casing, motive-agent ports leading from the exhaust-ports into the casing, and valves for controlling the exhaust-ports.

11. A steam-turbine comprising a casing divided into chambers, a piston separated into sections, mounted to rotate therein, and having a series of annular rows of buckets, a reversing-valve mounted to rotate in the wall of the casing and having diagonally-disposed ports, a gear mechanism for imparting rotary motion to the valve, and exhaust-controlling valves at opposite sides of the reversing-valve.

12. A steam-turbine comprising a casing partitioned into chambers, each chamber having longitudinal corrugations divided in the center circumferentially by a partition, a piston separated into sections, mounted to rotate in the casing, each section occupying one casing-chamber, and having a plurality of annular rows of buckets, the several rows of buckets increasing in area from the inlet end to the outlet end, a rotary valve extended lengthwise through the wall of the casing, and having diagonally-disposed ports increasing in area from the inlet end to the outlet end, inlet and exhaust ports leading from the said valve into the casing, exhaust-controlling valves extended through the wall of the casing, and through said exhaust-ports, an inlet-pipe for motive agent communicating with the inlet end of the first-named valve, and an exhaust-pipe communicating with the outlet end thereof.

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

CHARLES N. SCHOTTMULLER.

Witnesses:
FRANK J. SCHOTTMULLER,
GUSTAV MÜLLER.