No. 834,560. PATENTED OCT. 30, 1906.

W. T. CARTER.

TURBINE.

APPLICATION FILED JULY 13, 1906.

4 SHEETS—SHEET 1.

FIG. 1

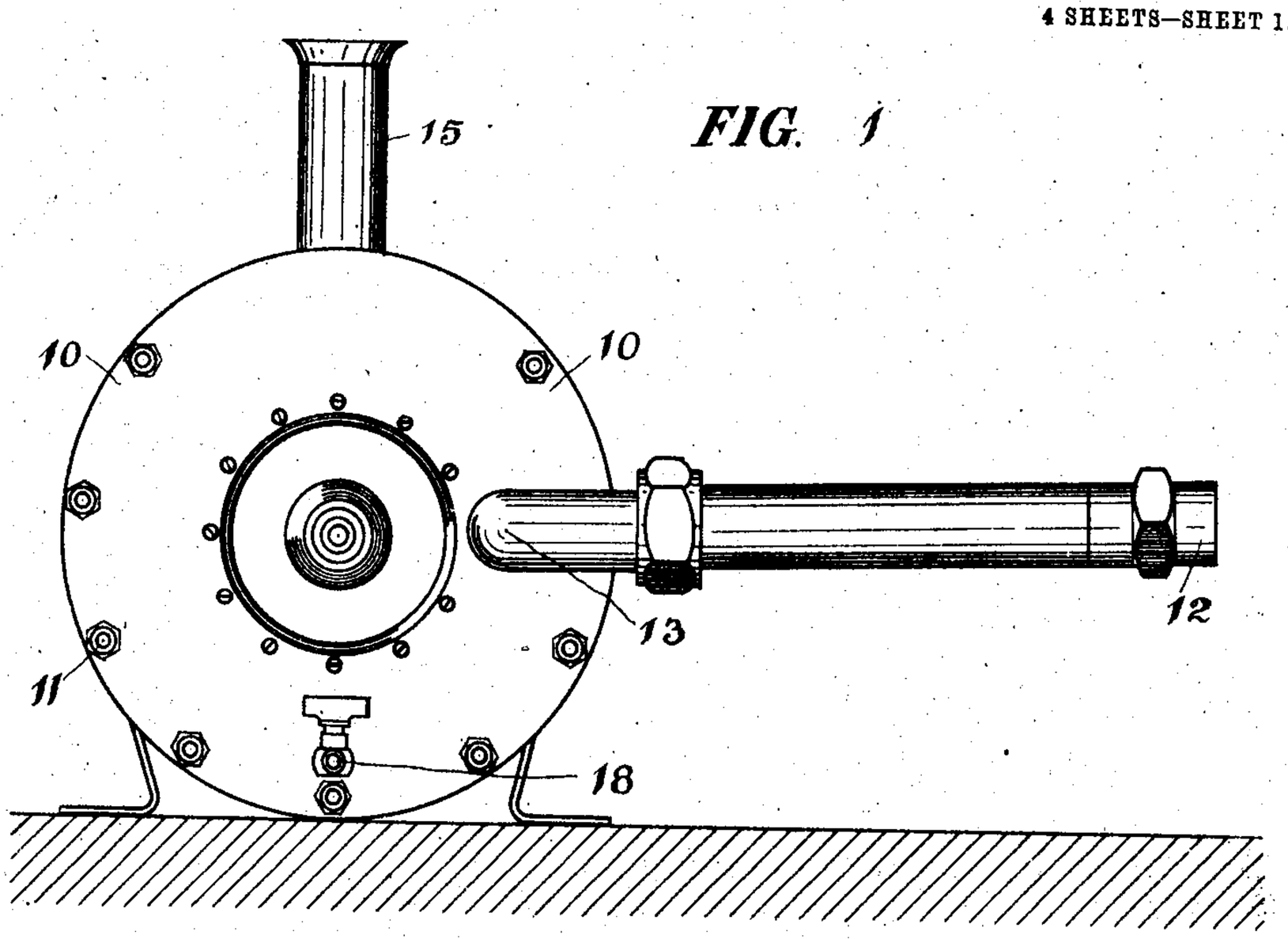
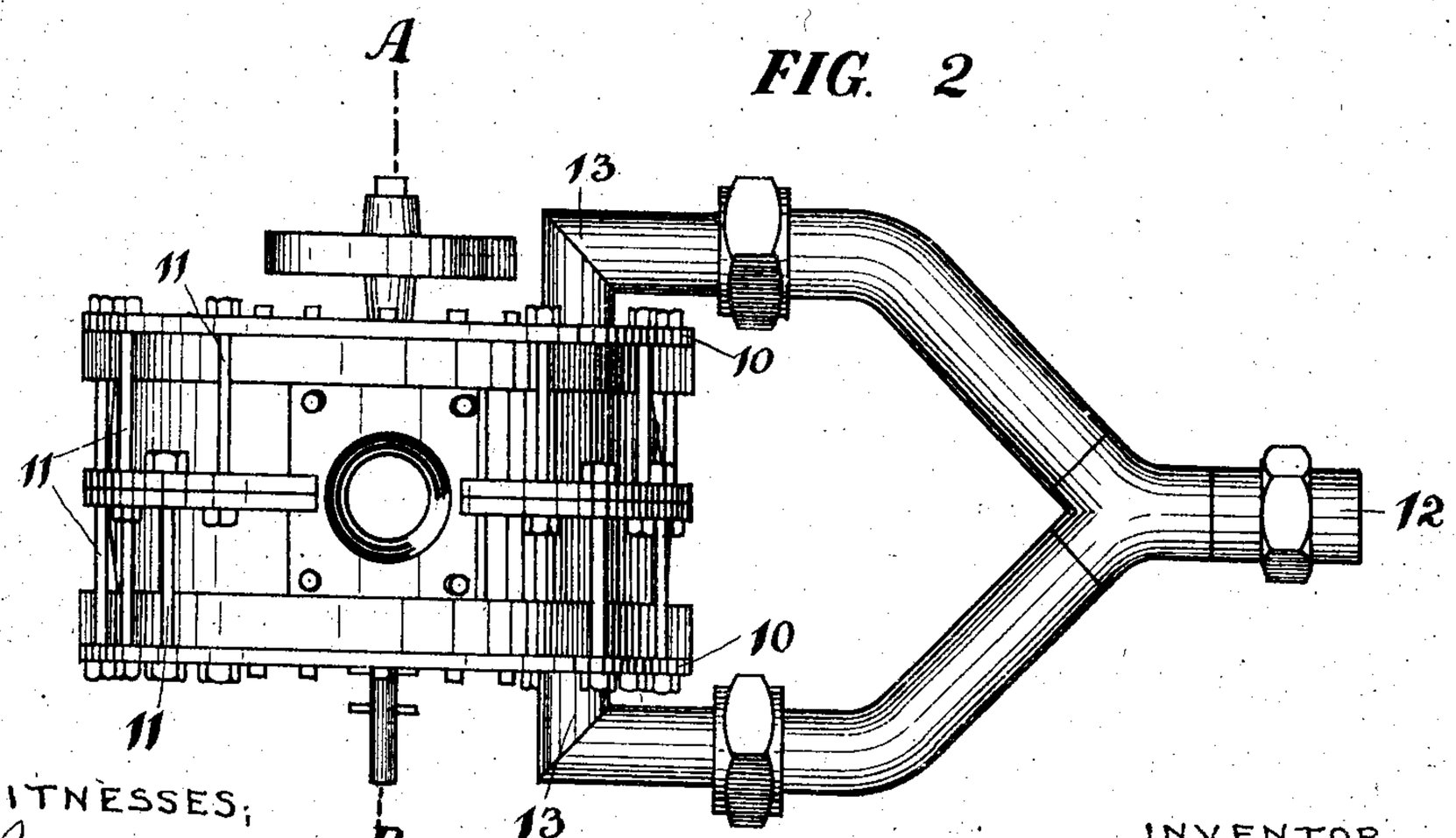


FIG. 2



WITNESSES;

John Hoving;

H. H. Berrigan

INVENTOR,

WILLIAM THOMAS CARTER,

by Fran Oldenweel

Attorney

No. 834,560. PATENTED OCT. 30, 1906.

W. T. CARTER.

TURBINE.

APPLICATION FILED JULY 13, 1906.

4 SHEETS—SHEET 2.

FIG. 3

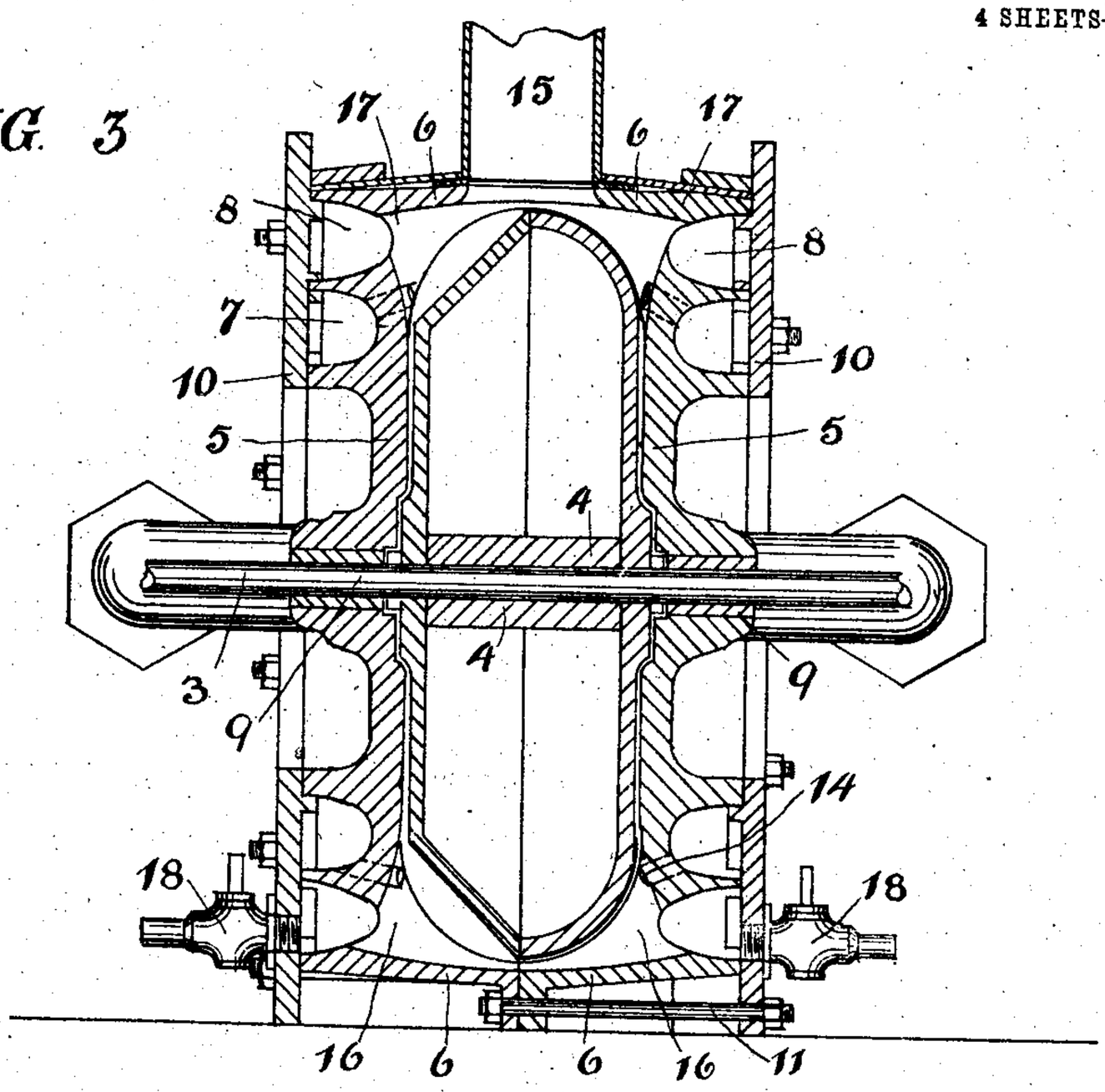


FIG. 4

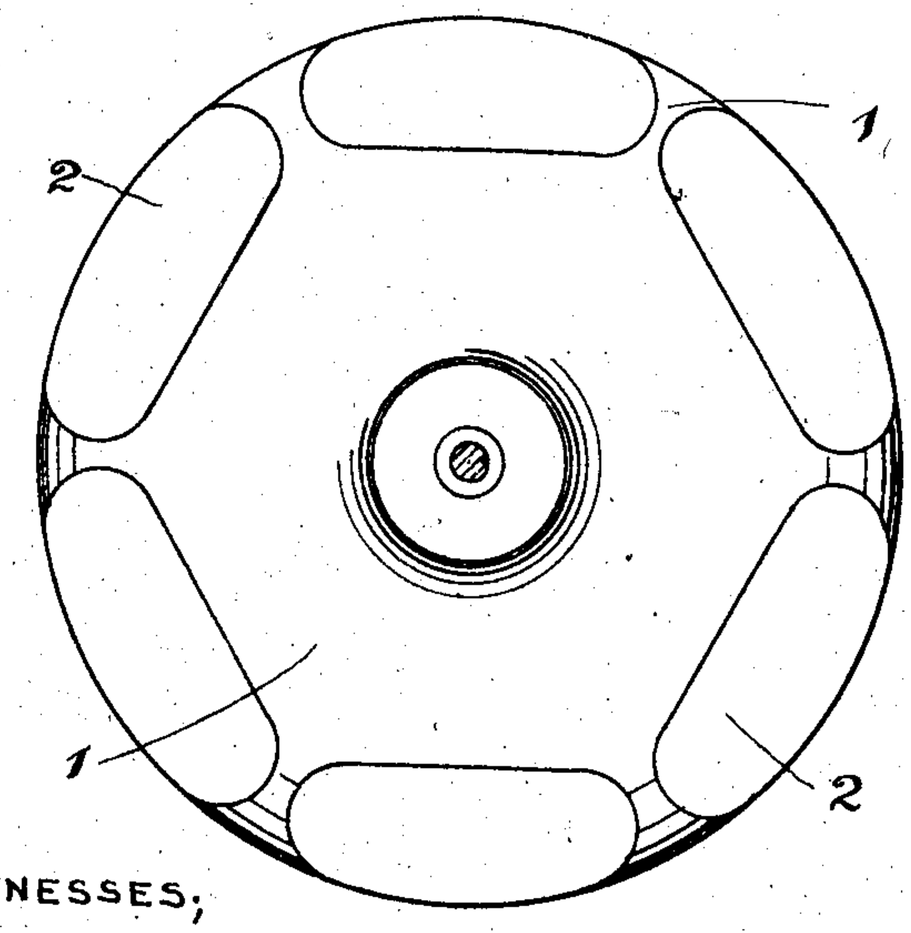
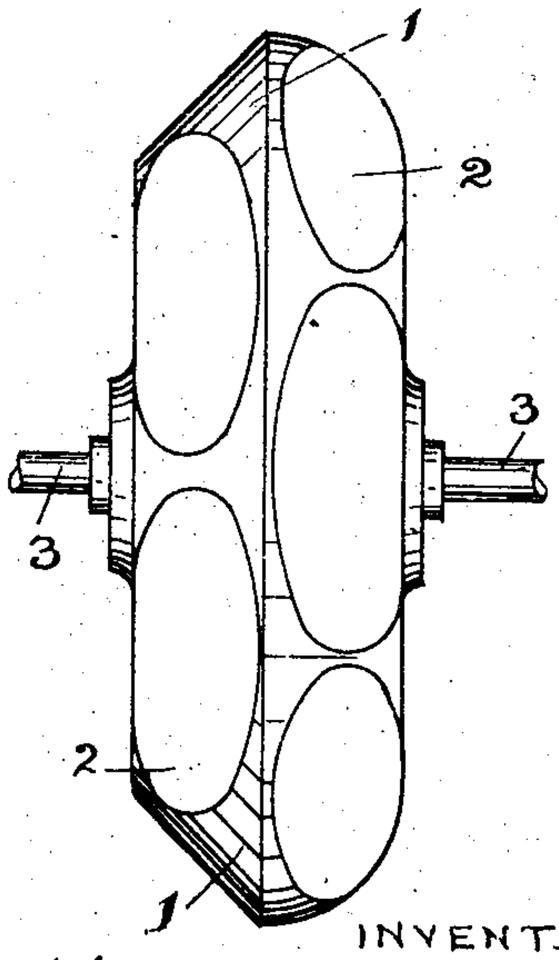


FIG. 5



WITNESSES,

John Hoving,

M. H. Berrigan.

INVENTOR,

WILLIAM THOMAS CARTER,

by Hvan Oldenneel

Attorney.

No. 834,560. PATENTED OCT. 30, 1906.

W. T. CARTER.

TURBINE.

APPLICATION FILED JULY 13, 1906.

4 SHEETS—SHEET 3.

FIG. 6

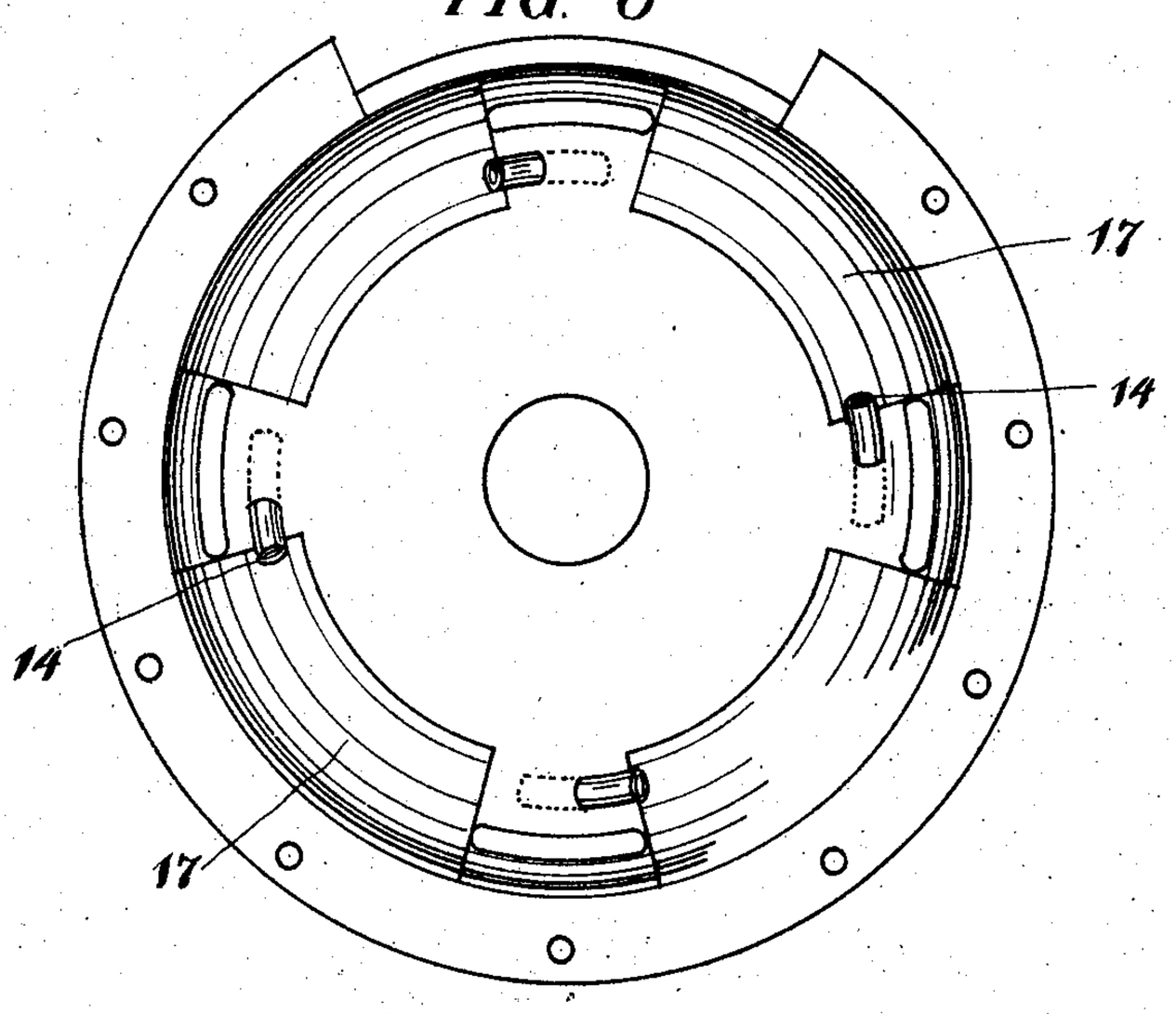
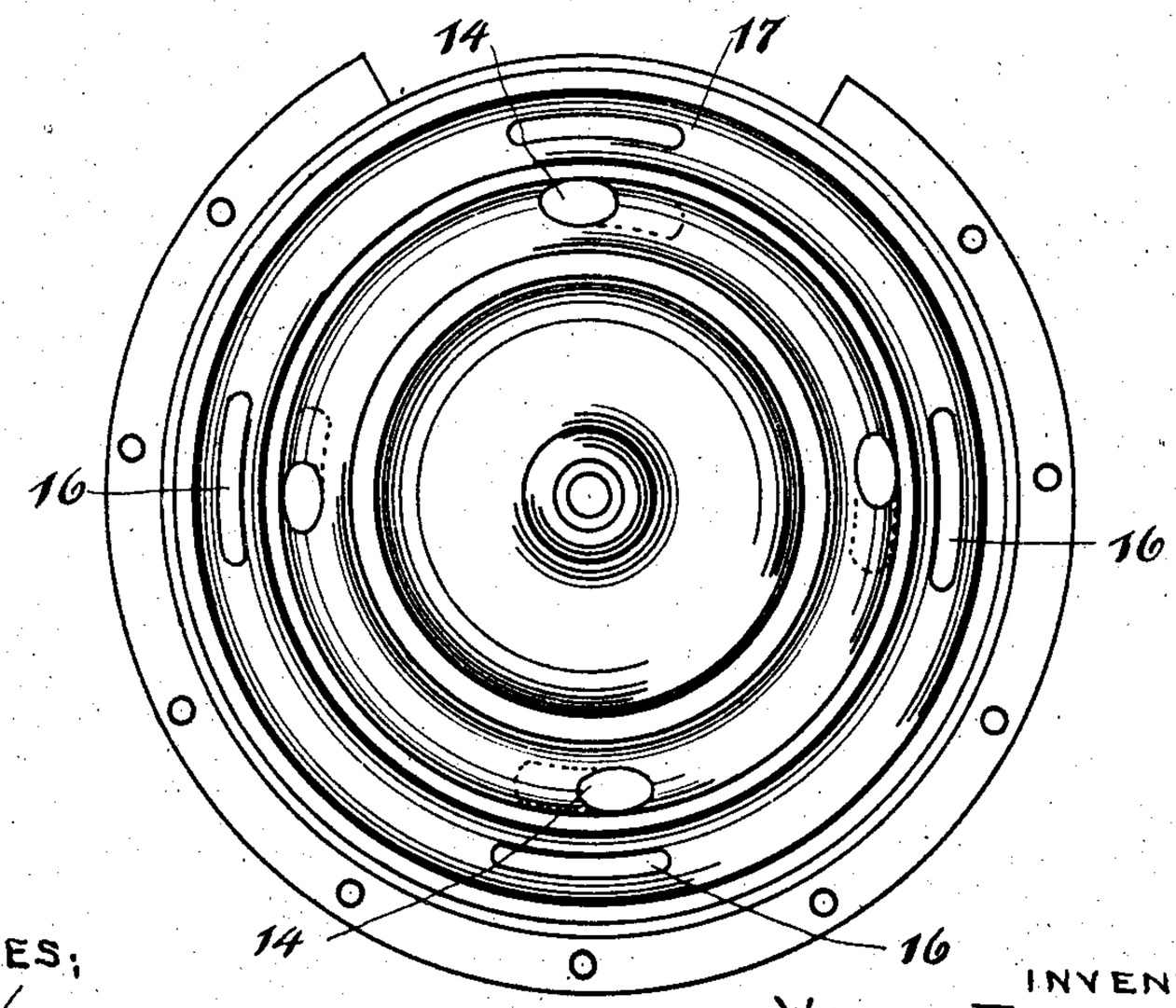


FIG. 7



WITNESSES;
John Hoving.
H. H. Berrigan.

INVENTOR,
WILLIAM THOMAS CARTER,
by Hvan Oldenneel
Attorney.

No. 834,560. PATENTED OCT. 30, 1906.

W. T. CARTER.

TURBINE.

APPLICATION FILED JULY 13, 1906.

4 SHEETS—SHEET 4.

FIG. 8

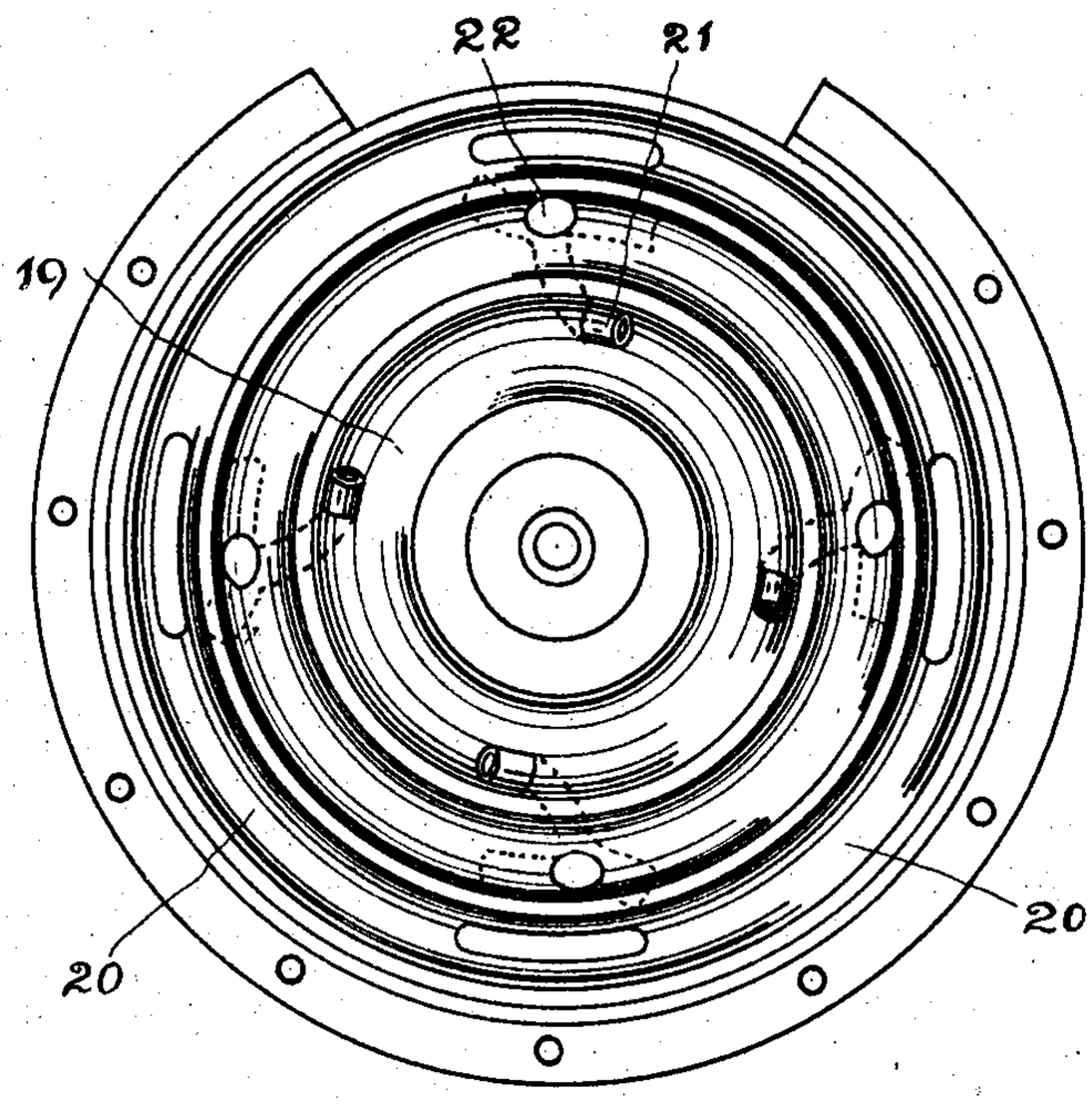


FIG. 9

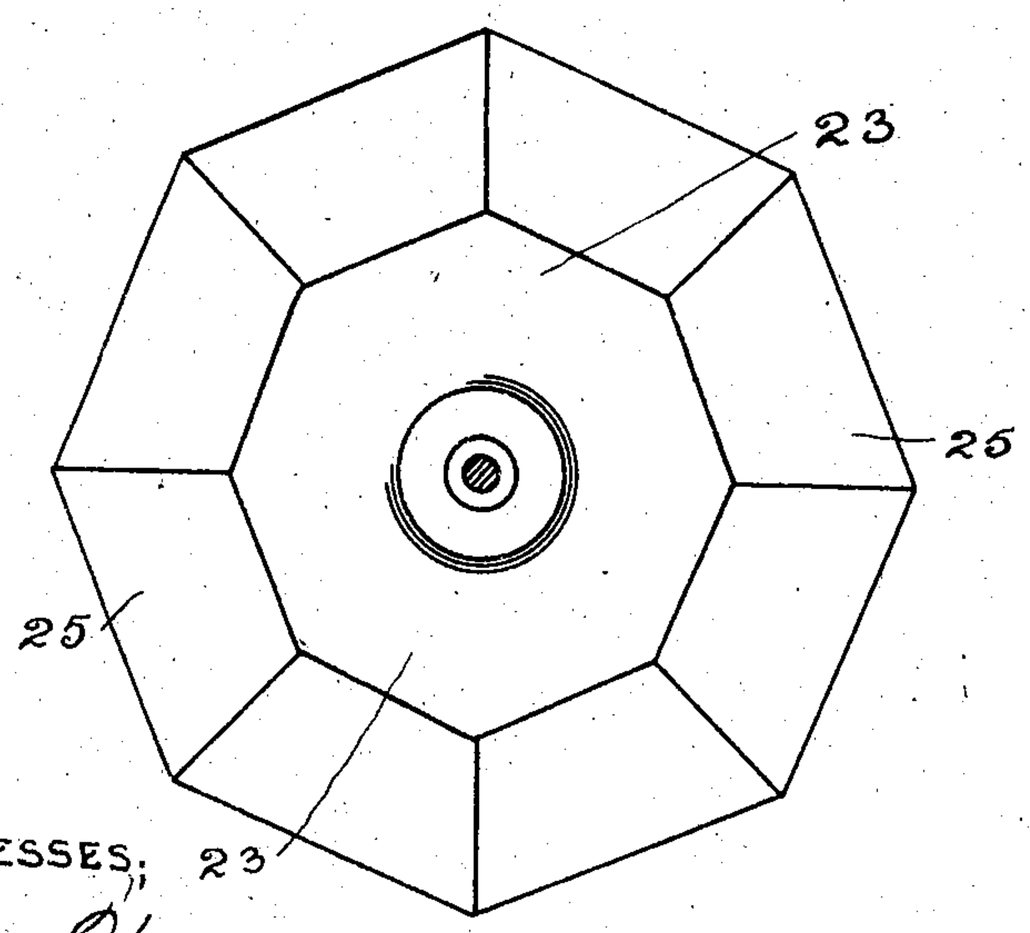
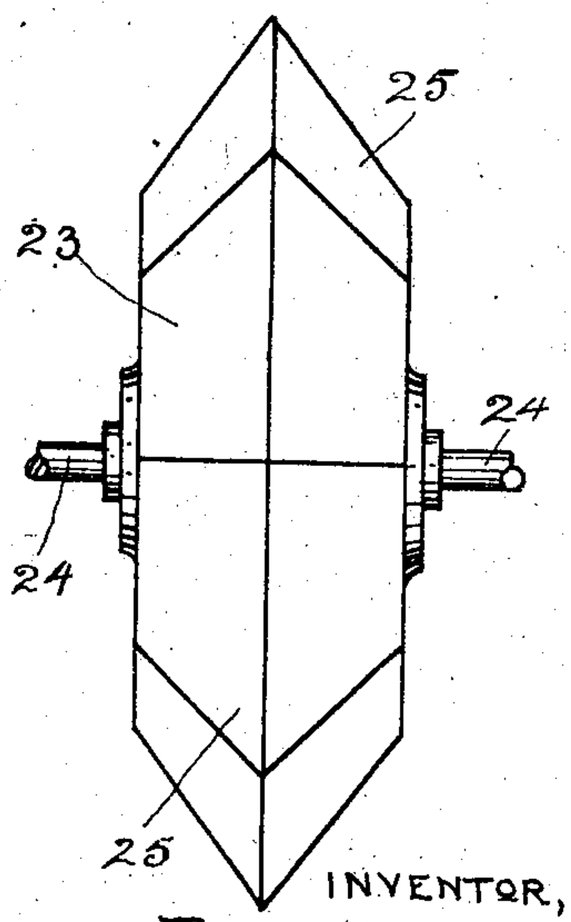


FIG. 10



WITNESSES:

John Hoving

H. H. Berrigan

INVENTOR,

WILLIAM THOMAS CARTER,

by Hay Oldenweel

Attorney.

UNITED STATES PATENT OFFICE.

WILLIAM THOMAS CARTER, OF BIRMINGHAM, ENGLAND.

TURBINE.

No. 834,560. Specification of Letters Patent. Patented Oct. 30, 1906.

Application filed July 13, 1906. Serial No. 326,089.

To all whom it may concern:

Be it known that I, WILLIAM THOMAS CARTER, engineer, a subject of the King of Great Britain, residing at 69 Cornwall street, Birmingham, in the county of Warwick, England, have invented certain new and useful Improvements in Rotary Motors or Turbines, of which the following is a specification.

My invention comprises improvements in rotary motors or turbines which are particularly intended for use in the propulsion of boats, but which may be employed for any other suitable purposes and may be actuated by fluid-pressure of either state, and which when driven by expansion are adapted to be employed either single or compound, so as to obtain the best effect from multiple expansion of the actuating fluid.

The object of my invention is improvements in rotary motors or turbines, whether single or compound, wherein all liability of obstruction or loss by rebound or backlash of the propelling fluid is either eliminated or greatly reduced and which when so desired may be equally effectively driven in the reverse direction. Rotary motors or engines constructed in accordance with my invention may be driven by fluid-pressure of any suitable kind, whether steam, water, explosion, or combustion.

In the construction of a rotary motor, engine, or turbine according to the preferred form of my invention I employ a wheel rotating within a suitable casing or between special concentric guides forming driving-chambers with the wheel, as hereinafter described. This wheel may be formed of any suitable metal or material—say steel—which would be preferably hollow and would be mounted on a suitable axle or trunnions. The periphery of the wheel is preferably round or curved in transverse section, and upon each side I form a series of plain flat surfaces, say, at an angle of forty-five degrees to the axle and extending to or almost to the center of the periphery. These flat or approximately flat surfaces on the one side may be opposite those on the other side of the wheel, or they may be placed alternately—that is, with the end of one surface opposite the center of a surface on the opposite side. The wheel rotates between a series of concentric fluid-guides, forming with the plain surfaces of the wheel driving-chambers, wherein motion is imparted to the wheel, which are of the same section as the periphery of the wheel, though slightly larger to provide clearance and allow free rotation of the wheel. These guides are of approximately the same length as the surfaces on the wheel. In a motor capable of reversing I provide a port for admission at either end of the guide, while for a non-reversible motor I employ one admission-port to each guide. These ports are fed by a suitable pipe, the port preferably expanding as it approaches the wheel-surface and is provided with an inlet-guide or deflector, which causes the driving fluid to impinge upon the periphery of the wheel, say, at an angle of forty-five degrees to its tangent and spreading the fluid over a wide area of the driving-surfaces.

When steam is employed for driving, it may be supplied to the admission-pipes directly from the boiler, separate supply-pipes being employed for the reversal, with a suitable three-way cock or other controlling means; but in the preferred form of my invention I employ two annular supply-chambers extending around the pockets and wheel, pipes from one supply-chamber communicating with the ports for driving in one direction, while the other chamber supplies the ports for imparting reverse motion.

In operation the fluid is continuously admitted to the ports for driving in one direction, which passes therethrough and impinges upon the flats of the periphery of the wheel at an angle of, say, forty-five degrees, causing the wheel to rotate. The fluid remains in contact with the plain surfaces upon the wheel until they have passed the opposite end of the guide, when the driving-chambers open to exhaust and releases to the atmosphere, condenser, or in the case of compound motors passes to the next wheel, which it drives in similar manner. Reversal of the wheel may be effected in any suitable manner, the manner of driving being the same as for the direction previously explained.

It will be seen that this invention avoids the loss of power caused by a fluid entering buckets on the wheel and which rebounds against the rear of the bucket or is carried around with same, thereby obstructing or delaying the free rotation of the wheel. Also by this invention the fluid is released immediately after performing its work, the wheel being readily adapted to be driven in the reverse direction with equal efficiency.

I do not confine myself to the employment of a wheel with a periphery of half-round

section, as other forms, such as V-section, may be used when desired. The guides are of similar shape to the periphery of the wheel, though preferably of a somewhat larger angle when applied to a wheel of V-section.

In some cases I may form the guides by employing disks covering each face of the wheel and secured together near the circumference, the exhaust being through apertures in the disks, which are so spaced or disposed as to provide guides and driving-chambers of the requisite length.

In order that my invention may be clearly understood and more readily carried into practice, I have appended hereunto four sheets of drawings illustrating the same, wherein—

Figure 1 is a side elevation of a steam-turbine constructed in accordance with one form of my invention, annular feed and exhaust chambers being located on either side of the wheel. Fig. 2 is a plan of the same form of the invention. Fig. 3 is a transverse section at A B, Fig. 2, looking in the direction indicated by the arrow, to a larger scale and showing the manner of arranging the annular chambers and wheel. Fig. 4 is a face view of the wheel removed. Fig. 5 is an edge view of the same. Fig. 6 illustrates the inner face of one-half of the driving-chamber removed. Fig. 7 is a similar view of the other face, showing the annular feed and exhaust chambers, the cover-plate being detached to disclose same. Fig. 8 is a similar view to Fig. 7, though of a modified form of driving-chamber, capable of driving in both forward and reverse directions, separate annular feed-chambers being provided for each direction of driving. Fig. 9 is a face view of a modified form of wheel of V-section, and Fig. 10 is an edge view of the same form of wheel.

In carrying my invention into practice according to the form illustrated at Figs. 1–7 I form the wheel 1 of suitable material, preferably of a light or strong metal, such as aluminium or steel, the said wheel being also preferably hollow. The periphery of the wheel is rounded in transverse section, and upon each side I provide a series of plain flat surfaces 2, inclined at a suitable angle—say forty-five degrees—to the axle 3, upon which the wheel 1 is secured, the said wheel being provided with a hub 4 for this purpose. The said wheel is rotatably mounted in a driving-chamber formed by two walls 5 5, secured together, such plates having flanges 6 6, which abut together, and thereby completely inclose the wheel. Upon the outer faces of these walls I form two annular chambers 7 and 8 for the feed and exhaust, respectively. In the center of these walls 5 I provide liners 9, wherein the aforementioned axle 3 rotates. These annular chambers 7 and 8 on each wall are closed by cover-plates 10, these cover-plates and the driving-chamber being secured together by any suitable number of bolts 11. Steam is fed in through the main pipe 12, which branches at 13 13 and enters each of the annular feed-chambers 7, from whence it passes by the tubes 14 to the driving-chamber. These tubes 14 are placed at such an angle to the surface 2 in wheel 1 as to cause the incoming steam to impinge upon such and cause the wheel to rotate in the desired direction. The steam exhausts chiefly from the driving-chamber to the funnel 15 and thence to the atmosphere, a portion of the steam passing through the three lower passages 16 to the exhaust-chamber 8 and thence to the funnel 15 by the passages 17. Drain-cocks 18 are preferably provided for running off the condensed steam from these exhaust-chambers.

As will be readily understood, when the steam enters the driving-chamber by the tubes 14 it impinges upon the flats 2 of the wheel 1 and causes same to rotate. By driving the wheel by the plain surfaces shown it is caused to revolve, with a minimum of obstruction, by the steam contained in the driving-chamber and previously used.

At Fig. 8 I have shown a modified arrangement of the driving-chambers by the use of which the wheel may be driven in either a forward or a reverse direction. In this form I employ two annular chambers 19 and 20 for feeding, the former being for forward driving, while the latter serves for reverse driving. Steam is conveyed from these chambers to the driving-chambers by tubes 21 22, inclined to the wheel in opposite directions, thereby causing the incoming steam to impinge upon the flat surfaces of the wheel in either direction, and thereby drive the wheel in the required manner. Means are provided for admitting the steam to either of these driving-chambers at will, such as a three-way cock. The exhaust illustrated is the same as previously described with reference to the non-reversing turbine.

Instead of employing a wheel with a curved periphery I may form same with a periphery of V-section, as shown by Figs. 9 and 10. In this form the wheel 23 is similarly mounted on an axle 24, flat surfaces 25 being provided for driving purposes.

As will be readily understood, I may employ any other suitable form of steam-feed, those illustrated being by way of example only.

What I claim, then, is—

1. In a rotary motor or turbine, a rotary wheel having a plurality of plain surfaces formed on each side of its periphery, said surfaces forming facets to receive impulses from the actuating fluid.

2. In a rotary motor or turbine, a rotary wheel having a plurality of plain surfaces

formed on each side of the periphery of said wheel, the surfaces constituting facets to receive impulses from the actuating fluid, and means for directing actuating fluid in the desired direction against said facets.

3. In a rotary motor or turbine, a rotary wheel having a suitably-shaped periphery in transverse section and a plurality of plain surfaces formed on each side thereof, and an annular feed-chamber having suitable inlets to the driving-chamber, and an annular chamber for facilitating exhaustion.

4. In a rotary motor or turbine, a rotary wheel having a suitably-shaped periphery in transverse section, and a plurality of plain surfaces formed on each side thereof, in combination with an annular feed-chamber having suitable inlets to the driving-chamber and an annular chamber for facilitating exhaustion, and with a separate annular feed-chamber with separate means for communicating with the driving-chamber, the whole arranged to permit the rotary wheel to be driven in a reverse as well as a forward direction.

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

WILLIAM THOMAS CARTER.

Witnesses:

JOHN WILLIAM WALTON,

FREDERICK GEORGE WELLS CORNER.