No. 763,336. PATENTED JUNE 21, 1904.

J. W. SWANSON.

ROTARY ENGINE.

APPLICATION FILED MAR. 11, 1904.

NO MODEL. 3 SHEETS—SHEET 1.

Fig. 1.

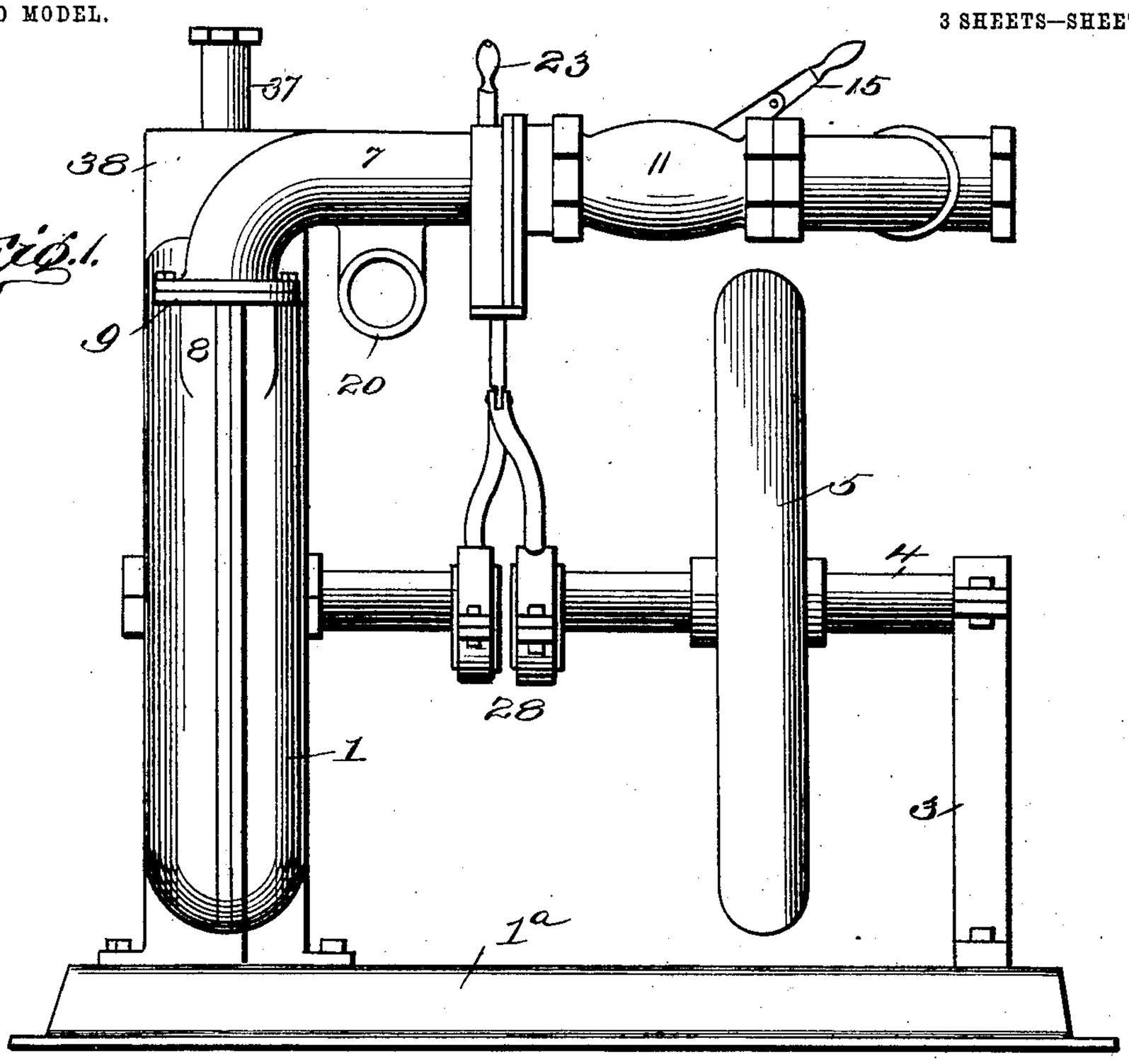
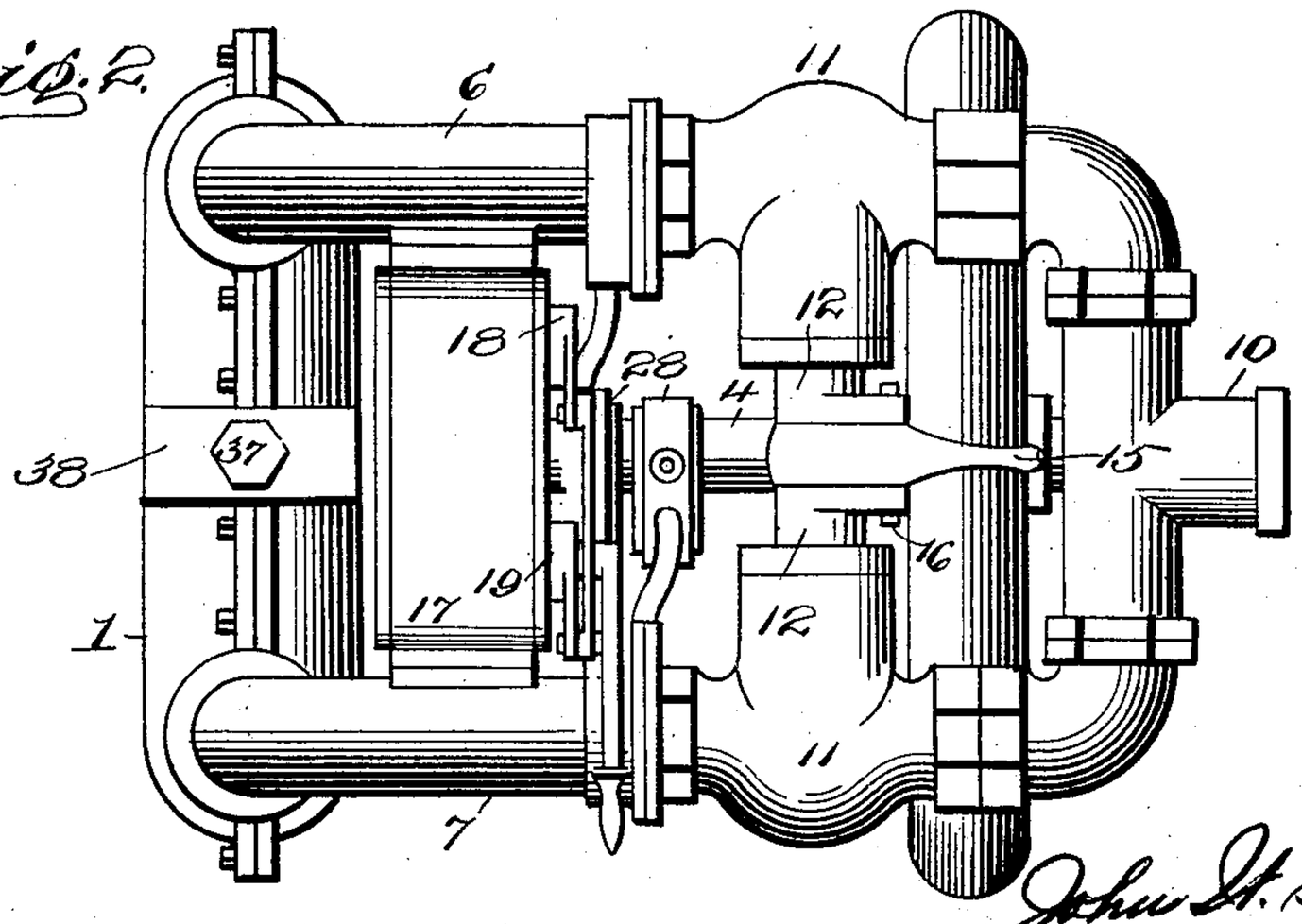


Fig. 2.



Witnesses

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NO MODEL. 3 SHEETS—SHEET 2.

Fig. 3.

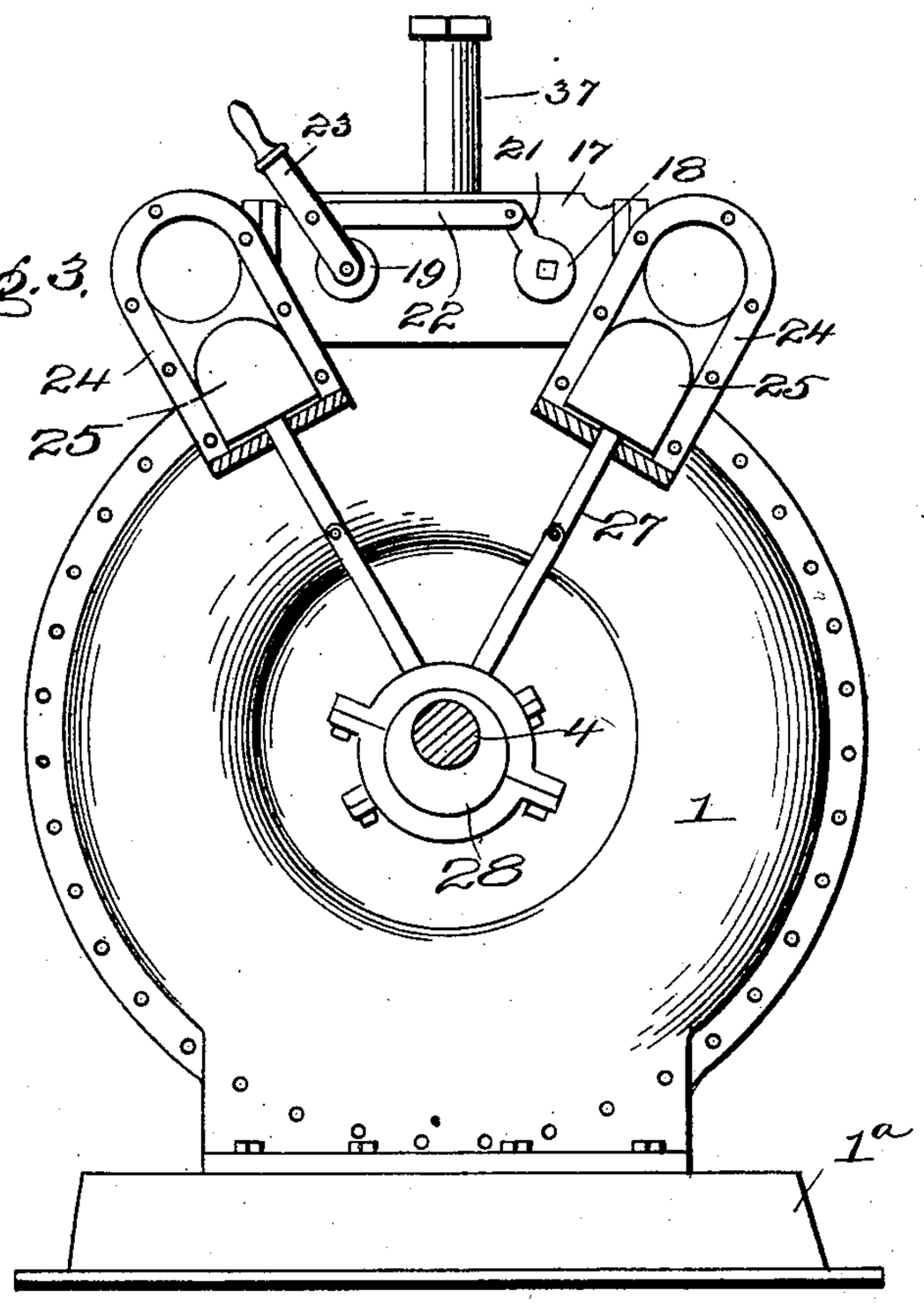
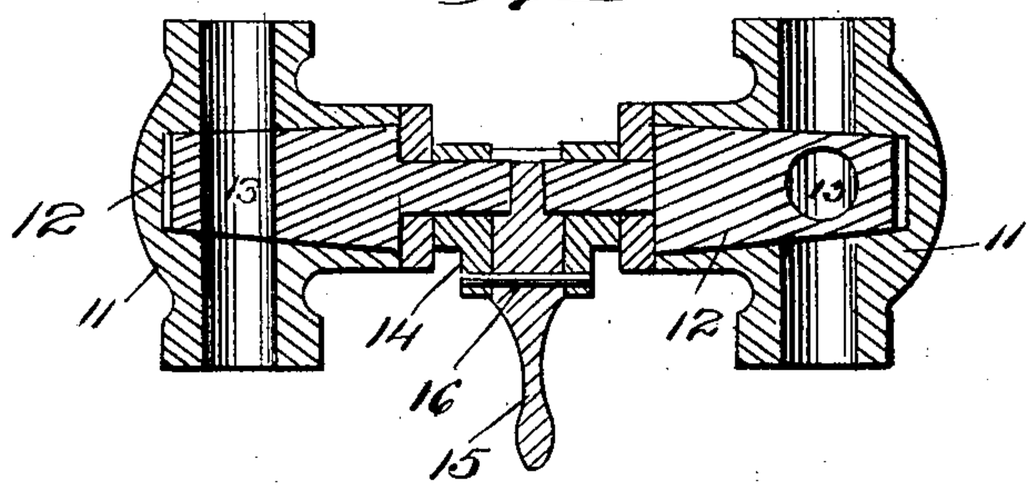


Fig. 6.



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NO MODEL. 3 SHEETS—SHEET 3.

Fig. 4.

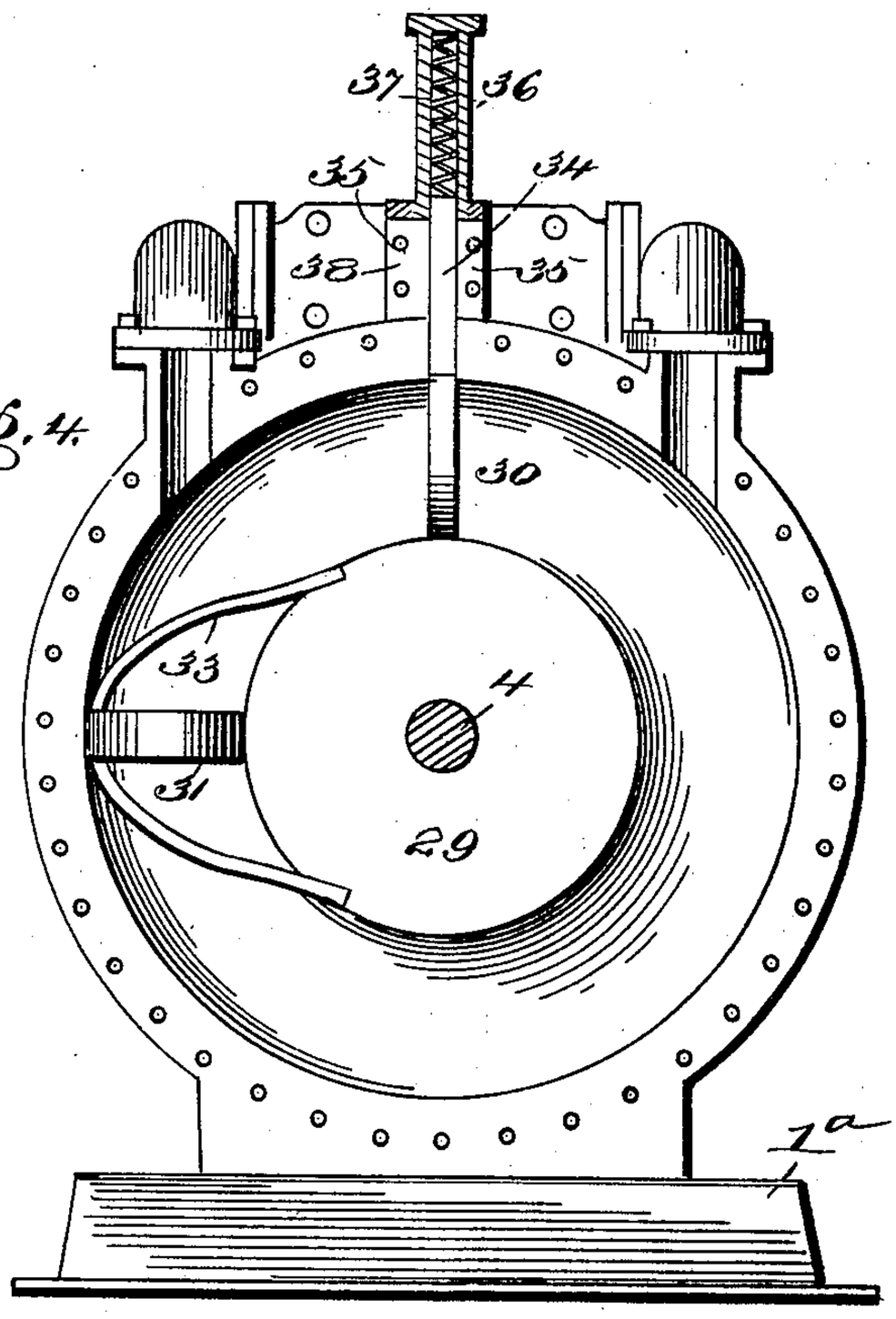
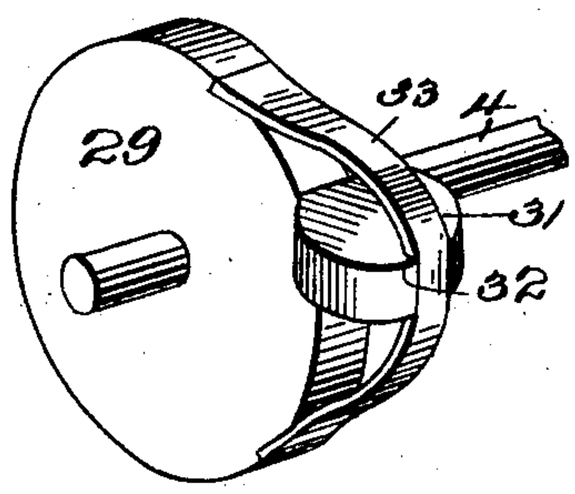


Fig. 5.



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No. 763,336. Patented June 21, 1904.

UNITED STATES PATENT OFFICE.

JOHN WM. SWANSON, OF BALLARD, WASHINGTON.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 763,336, dated June 21, 1904.

Application filed March 11, 1904. Serial No. 197,687. (No model.)

To all whom it may concern:

Be it known that I, JOHN WM. SWANSON, a citizen of the United States, residing at Ballard, in the county of King and State of Washington, have invented certain new and useful Improvements in Rotary Engines; and I do hereby 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 improvements in rotary engines.

The invention is designed to meet the existing difficulty in providing a suitable reversible turbine, and particularly for marine engines, where it is necessary to have a rapid reversing action and at the same time avoid the jar arising from the common crank-shafts in use on steamships.

The object of the invention relates more particularly to the construction of an engine of this class which is provided with reversing-valve means assembled with the intake-pipes of the engine, said pipes provided with communicating means within which an exhaust-valve mechanism is mounted.

Another object of the invention is to construct an engine which is provided with eccentric-valve means for facilitating the operation of the mechanism.

A still further object of the invention is to construct a mechanism which will be suitable for assembling with a secondary mechanism constructed similar thereto, said second mechanism provided with means for receiving the exhaust steam or fluid from the first mechanism.

With these and other objects in view the invention consists in the novel constructions, combinations, and arrangements of parts, as will be hereinafter fully described, illustrated in the accompanying drawings, and more particularly pointed out in the claims hereto appended.

In the drawings, Figure 1 is a side elevation of a complete mechanism constructed in accordance with my invention. Fig. 2 is a top plan view of the construction shown in Fig. 1. Fig. 3 is a transverse central section of the mechanism, showing the eccentric-valve means partly in section. Fig. 4 is a longitudinal sectional view of the cylinder, showing its coöperating members in an assembled position therewith. Fig. 5 is a perspective view of the rotary piston normally retained within the cylinder. Fig. 6 is a horizontal sectional view of the reversing-valve means.

Referring to the drawings by reference-numerals, 1^a designates a suitable base, upon which is mounted a sectional cylinder-casing, which is preferably secured to said base 1^a in a fixed position by any suitable removable means. Said cylinder-casing 1 is preferably secured near one end of the base 1, and upon the opposite end of said base is removably secured a suitable standard 3, which is formed near its upper end with means by which a driving-shaft 4 is journaled upon said standard 3, said shaft 4 being journaled in the sectional cylinder-casing 1 and adapted to extend transversely through said cylinder. Keyed upon the shaft 4 is a suitable drive or fly wheel 5.

Removably secured to the sectional cylinder 1 are a plurality of inlet or intake pipes 6 and 7, which are in communication with the interior compartment of the cylinder 1. The said pipes 6 and 7 are adapted to engage a protuberance 8, formed annular in shape, which is provided with an annular flange 9, adapted to receive a like member formed upon each of the inlet-pipes 6 and 7. A primary inlet-pipe 10 is provided with suitable communicating means assembled with said pipes 6 and 7. The said communicating means which is assembled with the inlet-pipe 10 comprises suitable reversing-valve casings 11, which are each provided with a rotary valve 12, preferably formed with a tapering body portion which permits of the taking up of wear upon said valves. It will be obvious that said valves 12 are formed with a suitable port 13. Said valves 12 are provided with integral stems, to which are keyed arms 14, and said arms 14 are provided with an actuating-lever 15, which is keyed to said arms 14 by means of a transverse pin 16, and the stems of the valves projecting into a recess formed upon the lever member 15 in each end thereof.

Assembled in a communicating position

with the intake-pipes 6 and 7 is a suitable casing 17, within which are mounted exhaust-valves 18 and 19, constructed similarly to the inlet-valves. (Shown in Fig. 6.) An exhaust-pipe 20 is assembled with said exhaust-casing 17 in a communicating position and beneath said casing. Said exhaust-pipe 20 is adapted to receive suitable communicating means for the purpose of providing a conduit to conduct steam or liquid from the discharge-casing 17 to the inlet-pipe of a secondary engine when it is desired to actuate a secondary engine by the same motive power employed for the operation of the first engine.

The exhaust-valves 18 and 19 are provided with means for the synchronous actuation of the same. Said actuating means comprises a suitable arm 21, keyed to or secured in any suitable rigid position to the valve 18, and said arm is provided with a link connection 22, which is movably connected to a lever 23, keyed to the valve 19. It will be obvious that by moving the lever 23 the valve 18 will be actuated and rotated within the exhaust-casing 17. Interposed upon each of the inlet-pipes 6 and 7 and between the reversing-valve mechanism assembled with each of said pipes is a sliding-valve casing 24, which comprises in its construction a plurality of sections which are secured in an assembled position by any suitable means. Within said casing 24 is slidably mounted an auxiliary-valve member 25, which is provided with a segmental portion at one of its ends, and at its opposite end an integral arm 27 is secured. Keyed upon the shaft 4 is a plurality of eccentrics 28, which are provided with suitable movable means which form a connection with the ends of the arms 27, secured to the sliding cut-off valves 25.

A rotary piston 29 is secured in a fixed position upon the shaft 4, and said piston 29 is provided with a cam structure for the purpose of actuating a sliding cut-off or valve 30. Said cam structure comprises an integral segmental member 31, said member 31 having a transverse groove or slot 32 upon its edge, within which is normally secured a guiding member 33. Said guiding member 33 is constructed of any suitable material and is secured at each end to the rotary piston 29 by any suitable means.

The sliding cut-off 30 is provided with an integral arm or extension 34, which is adapted to move between suitable guiding means 35 when the mechanism is in operation. The sliding cut-off or valve is normally held in engagement with the rotary piston 29 by cushioning means, which is shown in the drawings as a coil-spring 36. Said coil-spring 36 is mounted within a tubular casing 37, which is detachably secured to the guiding-casing 38, within which is formed the guides 35.

The general operation of the mechanism is as follows: If one of the valves 12, which is mounted in the reversing-valve casing 11, assembled with the inlet-pipes 6 an 10, is in the position shown in Fig. 6, (the port 13 is closed formed in the valve 12, which is mounted within the casing 11, assembled with the inlet-pipes 10 and 7,) it will permit of the discharge of steam or the like into the compartment formed within the cylinder 1 for the purpose of actuating the piston mounted therein. When the valves 12 are in the position shown in the drawings, it will be necessary to throw the valves 18 and 19 to the position indicated in the drawings, thereby closing the port formed upon the valve 18 and opening the port formed upon the valve 19. By this operation the pipe 7 and the open port on the valve 19 provides suitable communicating discharge means for the purpose of conducting the discharged steam to the pipe 20. If it is desired to reverse the engine, it will be necessary to shift the position of the rotary valves 12. Such operation is obtained by throwing the lever 15 to a position opposite that shown in the drawings. By this movement the port 13, formed in the valve 12, mounted within the casing 11, which is carried by the pipe 7, is brought into a communicating position with pipes 10 and 7, and the port 13, formed upon the opposite reversing valve, will be simultaneously closed. Upon the reversing of the valves 12 it will be necessary to reverse the discharge-valves 18 and 19, thereby closing the port in the valve 19 and opening the port formed in the valve 18, thereby providing discharge means for the exhaust-steam to the discharge-pipe 20. The purpose of the eccentric sliding valves is to prevent live steam or liquid from being discharged through the exhaust-pipe before the piston has completed its stroke and while the said steam is being fed to the compartment formed in the cylinder. If the mechanism is not provided with the sliding cut-off valves 25, the steam would be fed to the cylinder, and as the piston nears the end of its stroke, the segmental member 31 having passed the exhaust-pipe, direct communications would thereby be provided whereby the inlet-pipe is in direct communication with the exhaust-pipe. It will be obvious that this direct discharge will be the result if the sliding cut-offs, which are actuated by the eccentric means, were not employed in the construction of a completed device, whether or not the pipe 6 or the pipe 7 is temporarily employed for the discharge or the inlet means whereby the steam is conducted to or from the interior of the cylinder. The sliding cut-offs 25 are simultaneously actuated, thereby positively insuring the prevention of the continuous discharge of the actuating means for the rotary piston irrespective of which pipe, 6 or 7, is employed as an inlet for such means to said casing.

The mechanism is a complete part or section of the compound turbine and may be used singly; but in order to use the exhaust-steam or other liquids it is preferable to have a second engine or turbine connected directly in close proximity with the first mechanism, the dimensions, however, of the second turbine to be approximately twice that of the first in order to avoid any back pressure from the exhausting into the cylinder of the second turbine of the discharged steam or fluid. The exhaust-tube of the first mechanism should be constructed so as to exhaust into the intake-valves of the second mechanism, and, if desired, one or more additional turbines may be operated in conjunction and the entire power of the steam utilized before final discharge. The several turbines are arranged in line upon one shaft, but are provided with suitable coupling or clutch mechanism, whereby one or more may be used or disengaged from the shaft. In case of compound use or where there are several turbines assembled as described in order to permit of the rapid reversal of all of said turbines together and by a single operator it is desirable to have the reverse-levers severally connected with a hand-rod, so that by drawing said rod horizontally all of the inlet-valves are reversed synchronously and by moving the connecting-rod of the exhaust-valves laterally said valves are likewise synchronously reversed.

While I have shown in the accompanying drawings the preferred construction of my invention, it will be obvious to one versed in the art to which this invention relates that the same principle of operation may be obtained in a mechanism constructed in conformance with this invention, although such construction may be deviated from that specifically described and depicted in the accompanying drawings, and I therefore reserve the right to make such alterations, modifications, and changes as shall fairly fall within the scope of my invention.

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

1. A device of the character described, comprising a cylinder, a cut-off valve assembled therewith, a rotary piston provided with means for actuating said cut-off valve mounted within said cylinder, reversing-valve means assembled with said cylinder, communicating exhaust-valve means assembled with said cylinder and reversing-valve means and auxiliary-valve means interposed between said reversing and exhaust valve means.

2. In combination with a cylinder, a piston mounted therein, parallel communicating inlet means assembled with said cylinder, reversing-valve means mounted upon said inlet means, communicating exhaust means connecting said parallel inlet means, and auxiliary-valve means interposed upon said parallel inlet means between said reversing and exhaust means.

3. A device of the character described, comprising a cylinder, sliding cut-off means assembled with said cylinder, rotary-piston means provided with a cam-surface for actuating said sliding-cut-off means mounted within said cylinder, inlet communicating means provided with diverging communicating members assembled with said cylinder, simultaneously-actuated reversing and exhaust valve means assembled in a communicating position with said diverging members, sliding-valve means assembled with said diverging members and interposed between said reversing and exhaust valve means, and means for actuating said valve means.

4. A device of the character described, comprising a cylinder, a piston therefor, inlet communicating means provided with a plurality of diverging, communicating means assembled with said cylinder, reversing-valve means assembled with each of said diverging, communicating means, communicating exhaust means assembled with said diverging means between said cylinder and reversing-valve means, said exhaust means provided with valve means, sliding-valve means assembled with each of said diverging means between said reversing-valve means and exhaust means, and means for simultaneously actuating said sliding-valve means.

5. In combination with a cylinder, of a piston mounted therein, a plurality of communicating pipes or the like assembled with said cylinder, reversing-valve means interposed upon each of said pipes intermediate their length, communicating, exhaust-valve means assembled with said pipes between said cylinder and reversing-valve means, and sliding-valve means interposed upon said pipes between said reversing means and exhaust means.

6. In a device of the character described, the combination with a cylinder, a revoluble piston mounted therein, a sliding cut-off cooperating with said piston mounted within said cylinder, of a plurality of communicating pipes assembled with said cylinder, simultaneously-actuated reversing means assembled with said pipes, transverse communicating means assembled with said pipes, exhaust-valve means journaled within said transverse means, sliding synchronously-actuated cut-off means assembled with said pipes, and means for manually operating said reversing means.

7. In a device of the character described, the combination of a base, a cylinder secured near one end of said base, a standard secured to said base near the opposite end thereof, a shaft journaled in said standard and said cylinder, a revoluble piston keyed to said shaft within said cylinder, rotary, reversing, and ex-

hausting valve means assembled with said cylinder, sliding cut-off-valve means assembled in a coöperating position with said reversing and exhausting means, and eccentric means carried by said shaft and connected to said sliding-valve means for imparting motion thereto.

8. In a device of the character described, the combination with a base, of a removable standard carried thereby, a sectional removable casing provided with a cylinder mounted upon said base, a shaft assembled with said cylinder and standard, a piston keyed to said shaft within said cylinder, an inlet supply-pipe provided with a plurality of communicating members assembled with said cylinder, communicating exhaust means assembled with said pipes in a transverse position, valve means mounted within said communicating exhaust means, reversing-valve means assembled with said pipes, and valve means assembled with said pipes between said reversing means and said transverse exhaust means.

9. In a device of the character described, the combination with a cylinder, of a revoluble piston mounted therein, said piston provided with a segmental projection, a guiding member secured to said piston and segmental member, a sliding cut-off assembled with said cylinder and actuated by said piston, a plurality of communicating pipes assembled with said cylinder, said pipes communicating with a single inlet-pipe, a transverse communicating exhaust-compartment assembled with said pipes near said cylinder, a plurality of reversing-valve means assembled with said pipes near said single communicating pipe, simultaneously-actuated valve means interposed between said reversing means and exhaust-compartment upon said pipes, valve means mounted within said exhaust-compartment and means for actuating said valve means.

10. In a device of the character described, the combination of an annular casing having a compartment formed therein, a revoluble piston mounted within said compartment, a sliding cut-off assembled with said casing, said cut-off provided with an extension, a removable casing secured to said cylinder-casing, cushioning means removably mounted within said casing and adapted to normally press against said extension of the cut-off, inlet means provided with reversing-valve means assembled with said casing, exhaust means provided with valve means assembled with said inlet means, and auxiliary-valve means interposed between said exhaust means and reversing-valve means upon said inlet means.

11. A device of the character described, comprising a cylinder, a piston mounted therein, parallel, communicating inlet-pipes assembled with said cylinder, transverse exhaust means assembled with said inlet-pipes, valve means assembled with said transverse exhaust means, rotary, reversing-valve means assembled with said inlet-pipes, and eccentric actuated valve means assembled with said reversing-valve means.

12. A device of the character described, comprising a cylinder, a piston mounted therein, inlet diverging means assembled with said cylinder, valve means assembled with said inlet means, reversing-valve means assembled with said inlet means, exhaust-controlling-valve means assembled with said inlet means, and sliding-valve means coöperating with said piston and interposed between said reversing-valve means and exhaust-valve means.

13. A device of the character described, comprising a cylinder, a piston mounted therein, an auxiliary casing provided with cushioning means assembled with said cylinder, a sliding cut-off valve mounted within said cylinder, and provided with means for engaging said cushioning means, reversing-valve means assembled with said cylinder, exhaust-valve means assembled with said cylinder, sliding valves assembled with said reversing and exhaust valve means, and eccentrics coöperating with said piston and provided with means for imparting motion to said sliding-valve means.

14. A device of the character described, comprising a base, a standard secured thereto, a casing secured to said base, a horizontal shaft journaled within said casing and said standard, a fly-wheel keyed to said shaft, a rotary piston fixed to said shaft within said casing, eccentrics keyed to said shaft, a plurality of communicating pipes secured to said casing above said shaft, cut-off means assembled with said communicating pipes and actuated by said eccentrics, and reversing and exhausting valve means assembled with said communicating pipes and said casing for controlling the operation of the piston.

15. In combination with a cylinder-casing, of a piston mounted therein, horizontal inlet communicating means provided with a plurality of horizontal diverging, communicating means assembled with said cylinder-casing, reversing-valve means assembled with each of said diverging, communicating means, horizontal, communicating exhaust means assembled with said diverging means between said cylinder-casing and reversing-valve means, said exhaust means provided with valve means, auxiliary-valve means assembled with each of said diverging, communicating means between said reversing-valve means and exhaust means, and means for actuating said valve means.

16. In a rotary engine, the combination with a cylinder-casing, a support assembled therewith, a shaft journaled upon said support and in said cylinder-casing, a piston mounted upon said shaft within said casing, of a plurality of primary horizontal, communicating means assembled with said casing, horizontal, transverse, communicating means assembled with

said primary, communicating means, a plurality of valve members mounted within said transverse and primary communicating means, and means actuating said valve members.

17. In combination, of a cylinder, a piston mounted therein, inlet communicating means assembled with said cylinder, a primary valve mounted upon said inlet means, exhaust means assembled with said inlet means between said cylinder and primary valve, and an auxiliary valve interposed between said exhaust means and primary valve upon said inlet means.

In testimony whereof I hereunto affix my signature in presence of two witnesses.

JOHN WM. SWANSON.

Witnesses:
A. G. MATHER,
G. WARD KEMP.