No. 606,969. Patented July 5, 1898.

M. V. B. HOWE.

ROTARY STEAM ENGINE.

(Application filed June 10, 1897.)

(No Model.) 2 Sheets—Sheet 1.

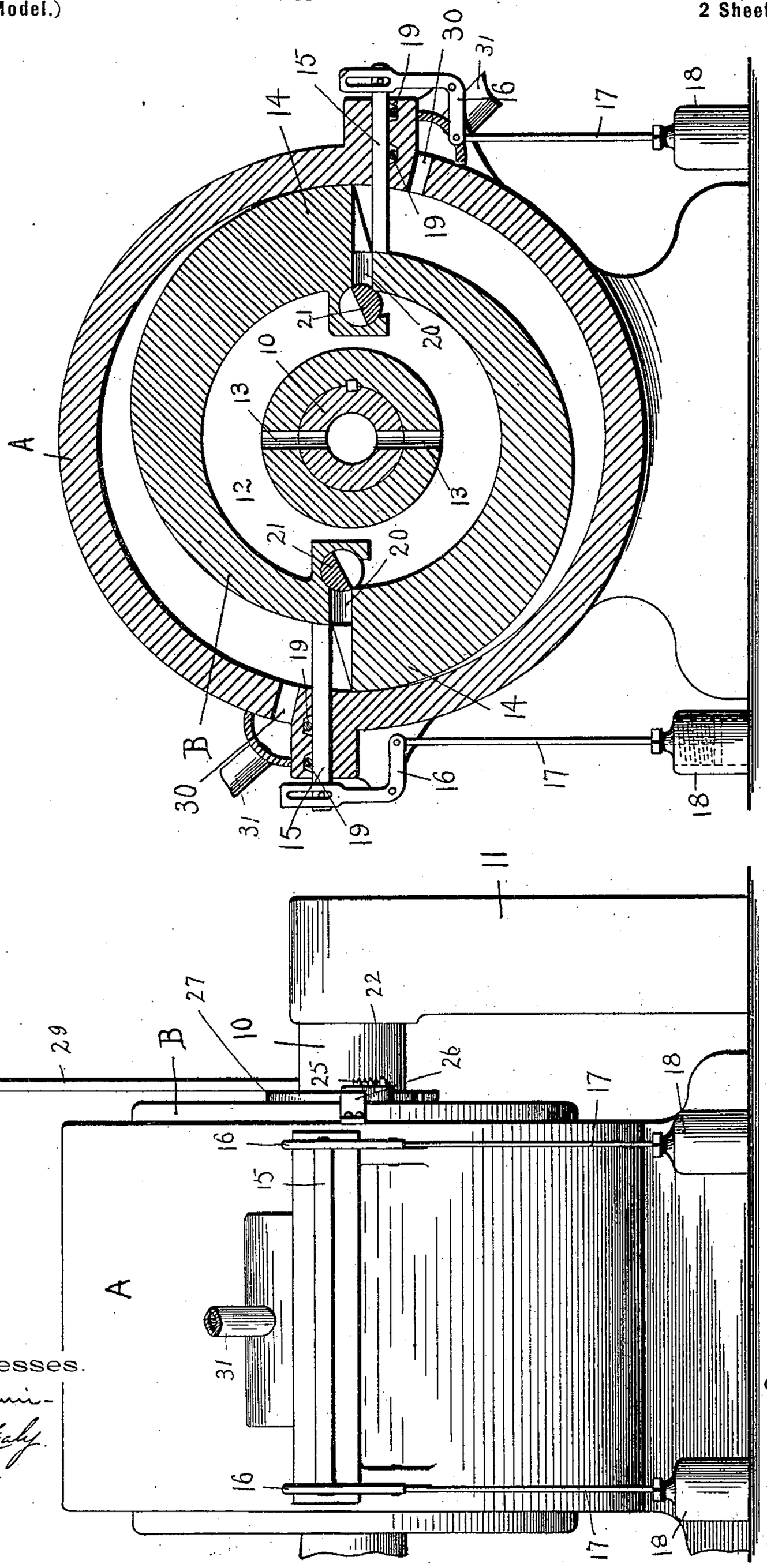

Fig. 2.

Fig. 1.

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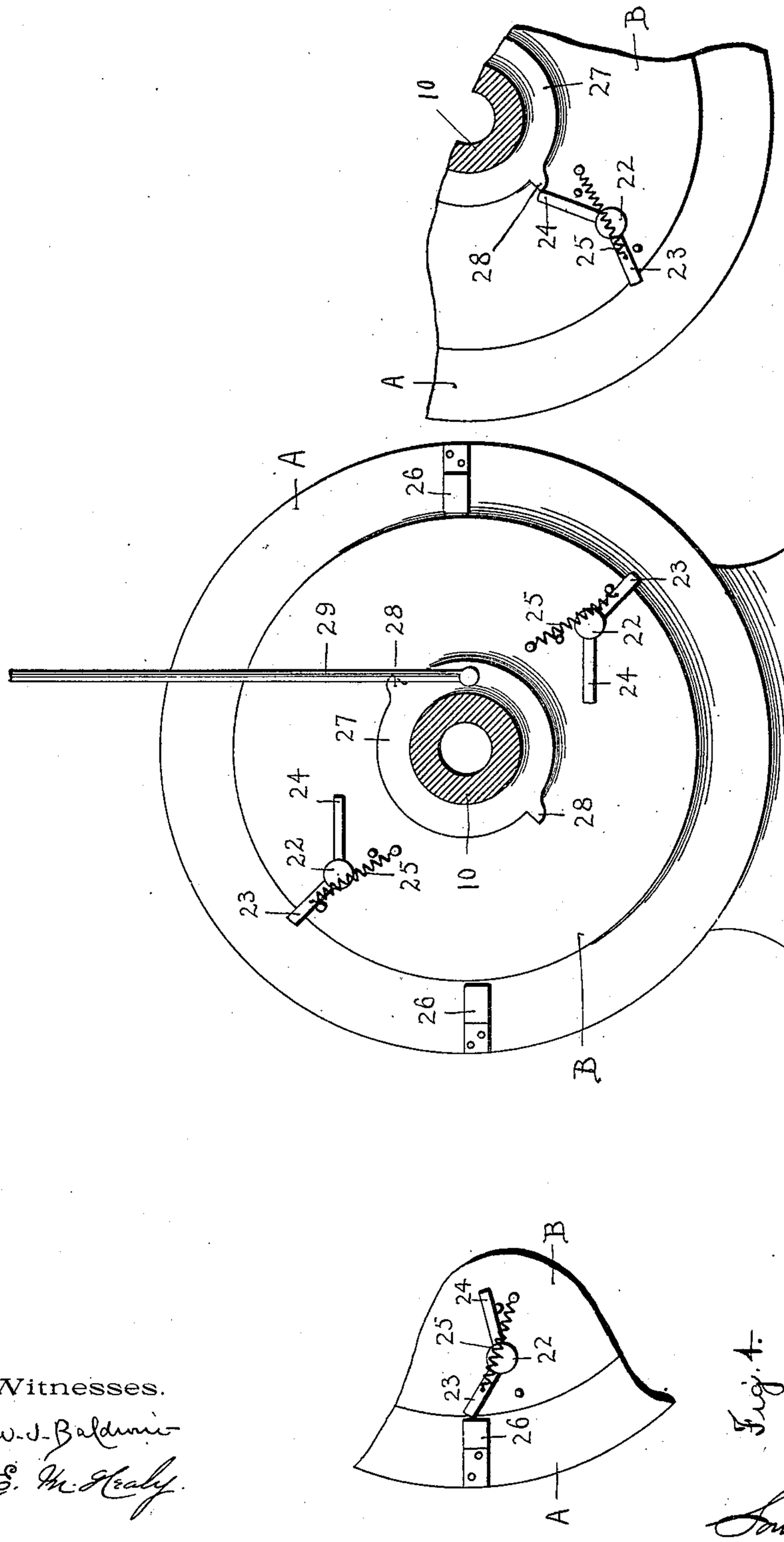

Fig. 5.

Fig. 3.

Fig. 4.

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UNITED STATES PATENT OFFICE.

MARTIN V. B. HOWE, OF GARDNER, MASSACHUSETTS.

ROTARY STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 606,969, dated July 5, 1898.

Application filed June 10, 1897. Serial No. 640,107. (No model.)

To all whom it may concern:

Be it known that I, MARTIN V. B. HOWE, a citizen of the United States, residing at Gardner, in the county of Worcester and State of Massachusetts, have invented a new and useful Improvement in Rotary Steam-Engines, of which the following is a specification.

My invention relates to a rotary steam-engine which has been especially designed to provide simple and efficient means for utilizing steam expansibly; and the especial object of my invention is to provide a rotary steam-engine of this class with a simple and efficient cut-off mechanism by means of which my engine is adapted to be efficiently employed in places where there is a considerable variation in the load.

To this end my invention consists of the parts and combinations of parts, as hereinafter described, and more particularly pointed out in the claims at the end of this specification.

In the accompanying two sheets of drawings, Figure 1 is a side view of a rotary steam-engine constructed according to my invention. Fig. 2 is a transverse sectional view of the same. Fig. 3 is an end view thereof, and Figs. 4 and 5 are detail views illustrating the operation of the construction which I preferably employ for operating the inlet-valves.

A rotary steam-engine constructed according to my invention comprises a casing or shell having a core or drum rotatably mounted therein. The core or drum is preferably made hollow and forms a steam-chest, to which steam may be admitted through the main shaft, which is bored out or made hollow.

Mounted in the casing of the engine and cooperating with the core or drum I provide one or more movable gates.

The core or drum is provided with one or more abutments, which are inclined or cam-shaped on one side and straight or plane on the opposite side.

One or more inlet-valves, preferably mounted in the rotary steam-chest, are arranged to admit steam from the steam-chest to the space between a gate and the plane face of one of said abutments.

The pressure of the steam confined between the movable gate and the projection or abutment of the movable core will tend to rotate the core, and during this rotation the inclined or cam-shaped face of the abutment will be brought into engagement with the movable gate, so as to force the same out of the way to allow the passage of said abutment, bringing the parts back into the position where steam will again be admitted in front of the movable gate.

Outlet ports or passages extend through the casing of the engine, so that when an abutment passes the same the steam will be exhausted or allowed to escape.

The inlet-valves are preferably spring-actuated and are arranged to coöperate with fixed and movable stops, the fixed stops being arranged to open inlet-valves, and the movable stops, which are preferably shifted by governor-controlled connections, are arranged to close the inlet-valves at different times, so as to provide a variable cut-off for regulating the admission of steam in front of the movable gates.

Referring to the drawings and in detail, A designates a cylindrical casing or casting which is mounted on a suitable pedestal or base in the ordinary manner. Rotatably mounted in the casing or casting A is a core or drum B, which is keyed onto and may be supported by a main shaft 10. The main shaft 10 is bored out or made hollow and may be journaled in suitable supports, as 11. The supply of steam for the engine is admitted to the main shaft 10 through one of the supports 11.

The drum or core B is preferably made hollow, as at 12, to form a rotary steam-chest, and the steam from the main shaft 10 is admitted to the space 12 through suitable ports 13 13.

By utilizing the hollow drum or core B as a steam-chest it will be seen that the same acts substantially in the same manner as a steam-jacket—that is to say, the heat of the steam in the rotary steam-chest will be more or less transmitted to the steam which is being used expansively, so as to substantially prevent cylinder condensation.

Extending from the rotary core or drum B are projections 14, two of such projections being shown in the engine illustrated in this application. The projections 14 are plane or straight upon one side and are inclined or cam-shaped upon their opposite side.

Coöperating with the rotary core or drum B are movable slides or gates 15. The gates or slides 15 are normally forced into engagement with the drum or core B by means of

suitable dash-pots 18, which are connected to actuate the gates 15 by means of links 17 and bell-crank levers 16.

Journaled in the rotary drum or core B are oscillating inlet-valves 21, which coöperate with the inlet ports or passages 20. By means of this construction steam which is admitted between one of the projections 14 and a movable gate 15 will turn or rotate the drum or core B. As the drum or core is rotated the cam or inclined face of one of the projections 14 will push the movable slide or gate 15 outwardly. As soon as a projection 14 has passed a movable gate 15 the gate 15 will be moved back into place by means of the dash-pots 18. In order to diminish the friction of the sliding gates 15, the same may be arranged to engage small roller-bearings 19, journaled in the casing A.

The connections which I preferably employ for automatically operating the oscillating inlet-valves are most clearly illustrated in Figs. 3 to 5, inclusive. As shown in these figures, the inlet-valves 21 are provided with valve-stems 22, extending through the end of the rotary core or drum B. The valve-stems 22 are provided with extending arms 23 and 24. Springs 25 are connected at their opposite ends to the arms 23 and the drum or core B. These springs 25 are arranged so that when in one position they will tend to hold the inlet-valves open, and when turned past the center of motion they will tend to hold the valves closed.

Secured upon the casing A are fixed stops 26, arranged to coöperate with the arms 23.

Rotatably mounted upon the main shaft 10 of the engine is a disk 27, having projections 28 for coöperating with the arms 24.

Any of the ordinary forms of governor may be driven from the main shaft 10 of the engine and may be connected by a rod 29 to oscillate or shift the disk 27.

As illustrated in Fig. 3, the valves are in a closed position, so that the supply of steam for the engine is cut off.

As the rotary core or drum B turns the arms 23 will be brought into engagement with the fixed stops 26, the springs 25 being thrown past the center of motion to hold the valves in this position, as illustrated in Fig. 4, and the valves will be kept open until the further rotation of the core or drum B brings the arms 24 into contact with the projections 28 upon the movable disk 27. When the arms 24 move into engagement with the projections 28, the valves will be shifted and the springs 25 will be thrown past their center of motion, so as to hold the valves closed, as illustrated in Fig. 5, and as thus arranged it will be seen that I have provided an extremely simple and efficient form of variable cut-off mechanism by means of which governor-controlled connections may be arranged to cut the supply of steam off at different relative points, so that the engine is adapted to work easily and satisfactorily under variable loads.

Outlet or exhaust ports 30, connecting with suitable exhaust-pipes 31, extend through the casing A in position to coöperate with the rotary core or drum B, so that when a projection 14 passes one of said outlet-ports the steam which has been confined between a movable gate 15 and a projection 14 will be exhausted and allowed to escape.

I am aware that many changes may be made in rotary steam-engines by those who are skilled in the art without departing from the scope of my invention as expressed in the claims, and while in the accompanying drawings I have illustrated simply a double form of engine employing two inlet-valves and two sliding gates it is obvious that the relative number of gates and valves can be increased or changed, as desired. I do not wish, therefore, to be limited to the form which I have shown and described; but

What I do claim, and desire to secure by Letters Patent of the United States, is—

1. In a rotary steam-engine, the combination of a cylindrical casing A, a hollow main shaft 10, a hollow core B having a plurality of abutments 14, connections for supplying steam to the hollow core B, whereby the same will form a steam-chest, and act substantially as a steam-jacket, a plurality of movable gates or partitions 15, inlet-valves 21 located in the core B for admitting steam to the spaces between the gates 15 and abutments 14, and means for operating said inlet-valves, substantially in the manner set forth.

2. In a rotary steam-engine, the combination of a casing A, a hollow core B having abutments 14, a hollow main shaft 10, connections for admitting steam to the hollow main shaft, gates or partitions 15 movably mounted in the casing, oscillating inlet-valves 21 mounted in and turning with said core, stationary stops 26 for opening the inlet-valves, and a governor-controlled piece 27 having stops for closing said inlet-valves, substantially as described.

3. In a rotary steam-engine, the combination of the casing A, a hollow core B forming a steam-chest, a hollow main shaft 10, connections for admitting steam to the main shaft 10, movable gates or partitions 15 mounted in the casing A, oscillating inlet-valves 21 mounted in and turning with the core B, outwardly-extending arms 23 arranged to engage stationary stops 26 to open the inlet-valves, inwardly-extending arms 24 arranged to coöperate with stops 28 on a governor-controlled piece 27, and springs 25 for holding the valves in their adjusted positions, substantially as described.

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

MARTIN V. B. HOWE.

Witnesses:
LOUIS W. SOUTHGATE,
PHILIP W. SOUTHGATE.