

No. 678,740.

Patented July 16, 1901.

M. KELLER.  
ROTARY ENGINE.

(No Model.)

(Application filed Mar. 12, 1901.)

3 Sheets—Sheet 1.

Fig. 2.

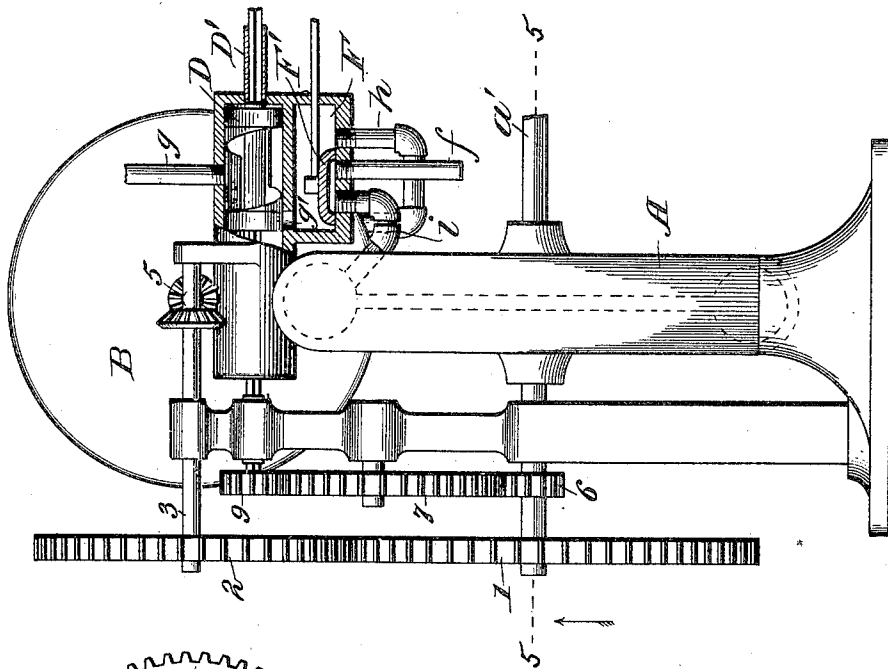
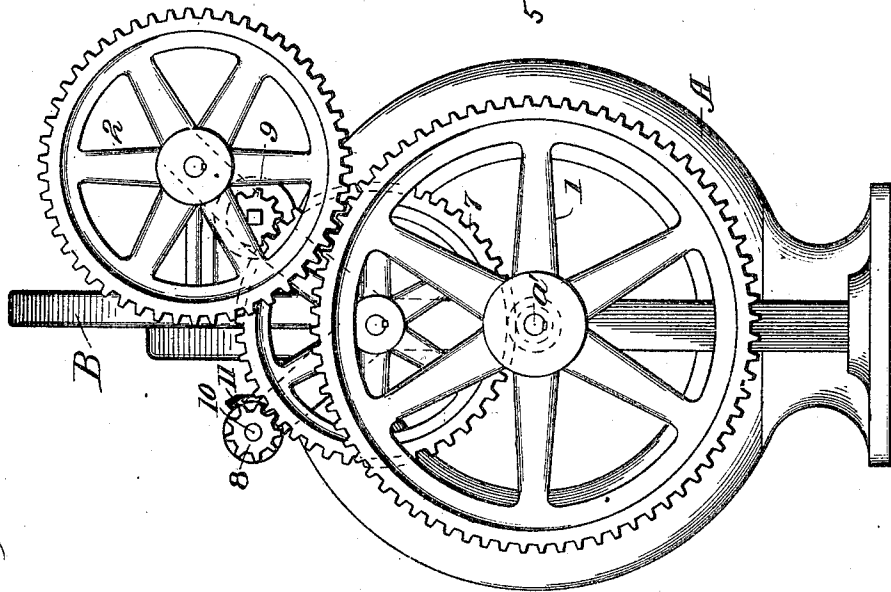


Fig. 1.



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Eugene W. Johnson.

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Fig. 4.

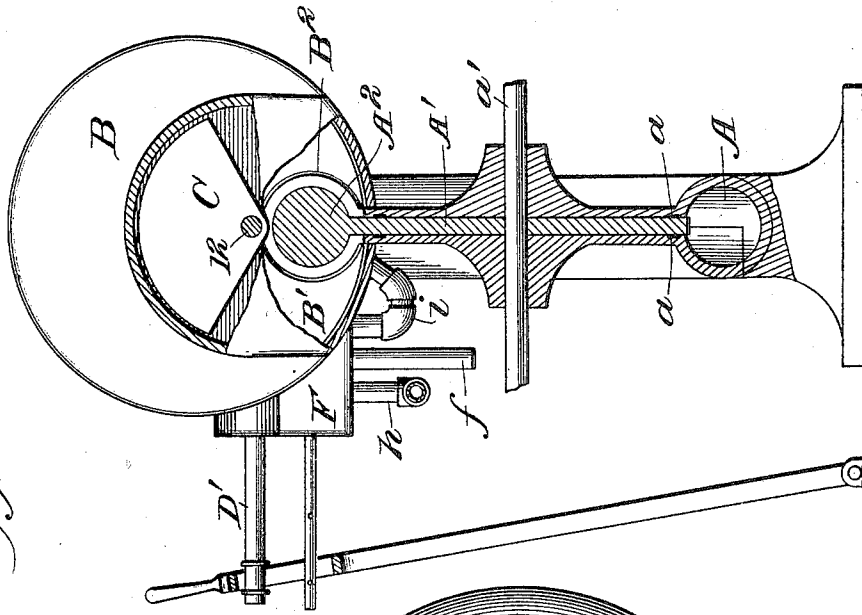
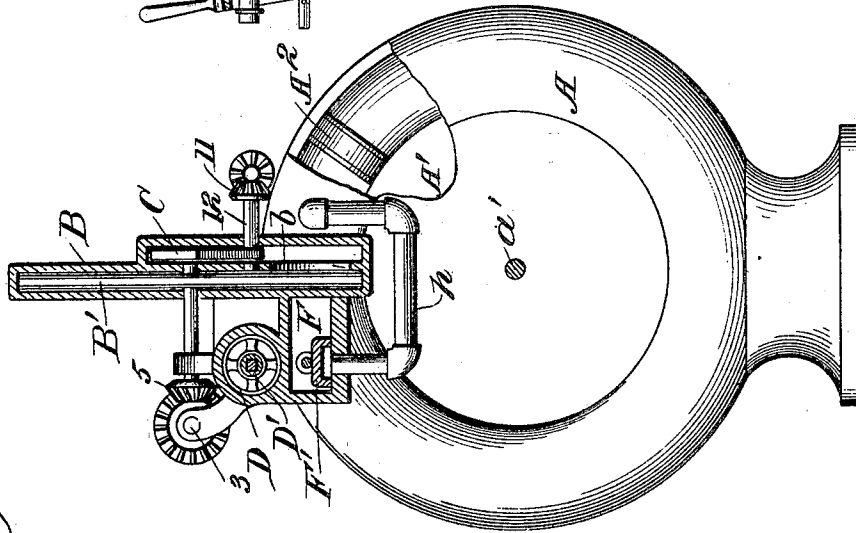


Fig. 3.



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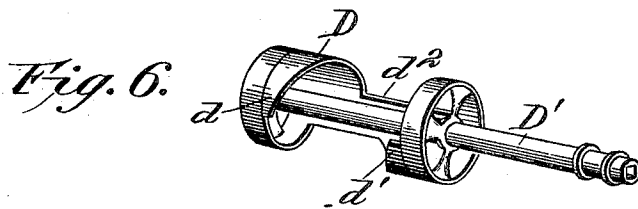
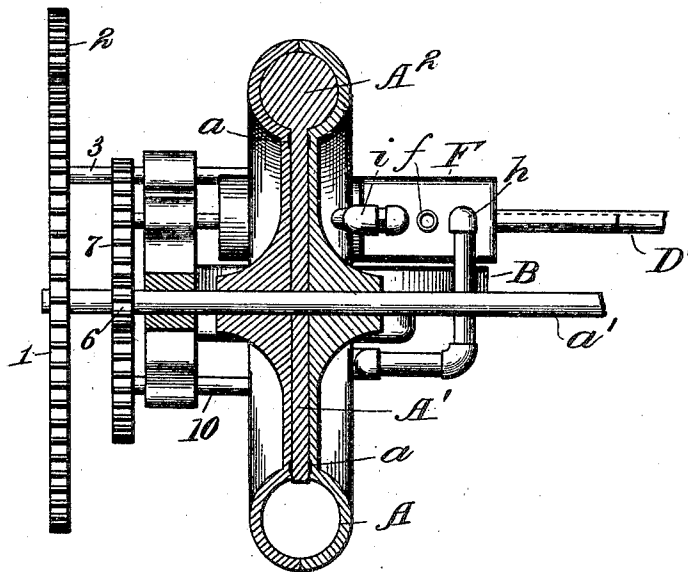
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3 Sheets—Sheet 3.

*Fig. 5.*



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# UNITED STATES PATENT OFFICE.

MORRIS KELLER, OF DAVID CITY, NEBRASKA, ASSIGNOR OF ONE-HALF TO  
JEREMIAH KELLER, OF SAME PLACE.

## ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 678,740, dated July 16, 1901.

Application filed March 12, 1901. Serial No. 50,841. (No model.)

*To all whom it may concern:*

Be it known that I, MORRIS KELLER, a citizen of the United States, residing at David City, in the county of Butler and State of Nebraska, have invented new and useful Improvements in Rotary Engines, of which the following is a specification.

This invention relates to certain new and useful improvements in rotary steam-engines; and it consists more particularly in the construction and arrangement of the parts, wherein are employed in proper combination an annular piston-passage, its piston, and two abutments, one of which revolves faster than the piston and the other at the same rate of speed as the piston, the construction being such that the piston-passage is opened by the abutments, so that the piston can pass beyond the same, providing means for opening and closing the piston-passage when the piston is in close proximity to the abutments, as will be hereinafter set forth.

The invention further consists in the construction of a valve for controlling the admission of steam to the piston-passage and cutting it off from said passage when desired, the valve being so constructed that it may be used to stop the engine, and when the engine is running either backward or forward said valve can be so positioned as to cut off the steam at any desired point of travel of the piston, so that after it is cut off it will operate expansively upon the piston, said valve also having a part which will positively cut off the steam from the piston-passage when the piston is passing the abutments.

The invention also consists in the construction and combination of the parts, as will be hereinafter set forth, and specifically pointed out in the claims.

In the accompanying drawings, which illustrate my invention, Figure 1 is a side elevation of a rotary engine embodying my improvements. Fig. 2 is an elevation at right angles to Fig. 1, the chamber for the rotary or expansion valve and the steam-chest for the reversing-valve being shown in section. Fig. 3 is a side elevation, partly in section. Fig. 4 is a vertical transverse section. Fig. 5 is a sectional view on the line 5 5 of Fig. 2 looking upward, and Fig. 6 is a perspective

view of the controlling or expansion valve detached.

An engine constructed in accordance with my invention has a cylinder with an annular piston-passage A, the cylinder being made up in any suitable manner and is connected or mounted on a base. The cylinder has packing-rings *a* positioned adjacent to the annular piston-passage, said rings contacting with the disk A', to which the piston A<sup>2</sup> is secured. The interior side walls of the cylinder are enlarged centrally to provide bearings for the main shaft *a'*, and the disk which carries the piston is rigidly attached to this main shaft. At a suitable point the piston-passage is intersected by openings through which pass abutments, and the piston is considerably wider than said openings. The opening through the cylinder is inclosed by the casing for the abutments, said casing B being positioned at right angles to the cylinder, so that the abutments may intersect or traverse the piston-passage, and on opposite sides of the casing are passage-ways or ports through which steam is admitted and exhausted from the piston-passage.

The casing in which is located the abutments is made up to present two chambers, and in one of said chambers is journaled a disk B', having adjacent to its periphery a single opening B<sup>2</sup>, the diameter of said opening being considerably larger than the diameter of the piston, and in the other chamber of the casing there is journaled a smaller abutment or sector C, the same being in gear with the main shaft *a'*, so as to turn in unison or at the same rate of speed as the piston, while the larger abutment or disk is also in gear with the main shaft, so that the larger abutment turns at much higher rate of speed than the piston, making two or more revolutions to each one of the sector. The central wall of the casing adjacent to the opening through which passes the piston projects slightly above the lower wall of the casing, so that the pressure of steam in the piston-passage will have a tendency to force the abutments against the circumferential wall *b* to provide a steam-tight joint, and the abutments may have suitable packings.

By providing two abutments which move

at different rates of speed a quick and positive means for intersecting the piston-passage is provided, and before the piston has passed both abutments one of them, the disk or abutment B', intersects the piston-passage, bringing its opening on a line with the piston, when the other abutment is raised and the other abutment C is lowered, so as to intersect the piston-passage after the piston has passed, and this provides a quick and effective means for opening and closing the piston-passage almost instantaneously upon the approach and passage therethrough of the piston.

In connection with the abutments and practically in the same train of gearing therewith is a valve D, which controls the entrance of steam to the piston-passage, said valve being located in a chamber having a cylindrical portion with an exit-port over which the valve can be positioned, and the chamber or chest is of such a length that the valve may be moved longitudinally therein to control the entrance of steam to the steam-chest and from thence to the piston-passage when the engine is running in either direction. An inlet-pipe *g* communicates with the chamber containing the rotary controlling-valve, and the port *g'* leads into a steam-chest F, which has an exit-pipe *f* and pipes *h* and *i*, which communicate with the piston-passage. The steam-chest or valve-chamber F has therein a valve F', which is movable over the ports to direct the steam through either of the pipes *h* and *i*. The controlling or regulating valve D and the valve F' may be moved manually according to the direction which it is desired that the engine should turn.

The rotary or turning parts of the engine are driven from the main shaft *a'*, said shaft having thereon a gear-wheel 1, which is in mesh with a gear-wheel 2, carried by the shaft 3, said shaft having a pinion which meshes with a pinion 5 on the shaft which is attached to the disk or abutment B', said train of gearing being so organized and proportioned that when the piston is in close proximity or on a line with the opening through the disk B' said opening will be opposite the piston-passage, and as the disk moves much faster than the piston the opening will be brought opposite the piston-passage two or more times during one revolution of the piston. This is to effect a quick cut-off and opening of the piston-passage.

To the main shaft between the toothed wheel 1 and the cylinder there is attached a pinion 6, which meshes with the idle gear-wheel 7, which in turn meshes with gear-wheels 8 and 9, the latter being on a shaft which has a squared portion within the chamber for the valve D, which valve is mounted on a tubular shaft having a rectangular bore, so that the valve can be moved longitudinally thereon, as is done to control the cut-off of the steam to the piston-passage when the engine is reversed and the train of gear-

ing is such that the valve D is turned at the same rate of speed as the piston. The gear-wheel 7 also drives a pinion 8, mounted on the shaft 10, having a beveled pinion which meshes with one on the shaft 10, the beveled pinion engaging with one, 11, on the shaft 12, to which the sector or abutment C is secured within the casing. The gearing for the sector or abutment C is such that the sector turns at the same rate of speed or in unison with the piston, and only at one time is this sector raised or out of line with the piston-passage, that time being when the opening through the fast-moving abutment is opposite the piston-passage.

Other gearing may be substituted for that shown, and any suitable form of frame may be used for supporting the shaft, and any form of lever or equivalent means may be used for moving the controlling-valve D in its chamber and the valve F' in its steam-chest.

The controlling-valve D is for the purpose of regulating the admission of steam to the piston-passage, and its construction admits of a longitudinal movement in its chamber, while it has a constant rotary movement, so that the valve can be positioned to entirely cut off the steam to stop the engine or to admit the steam to the piston-passage when the piston has reached a predetermined point therein, so that after the steam has been cut off it will work expansively against the piston, said valve also having a part which effects a cutting off of the steam when the piston is in close proximity to the abutments and while passing the same when the engine is running under a full head of steam, the steam in such instance not being used expansively.

The controlling-valve D is made up to present curved or nearly semicircular end portions *d* and *d'*, which would be spiral were they not separated from each other by the longitudinal portion *d*<sup>2</sup> of the valve, said portion being curved transversely so as to operate effectively over the port *g'* through the valve-chamber, and this valve has cylindrical end portions of a sufficient width to cover the port. The valve is attached to a tube or pipe D', which turns in unison with the shaft attached to the gear-wheel 9, and by moving the tube the longitudinal position of the valve will be changed. The controlling-valve turns in the same direction as the piston and by adjusting it in its casing the steam can be cut off at any predetermined point, so that beyond said point the steam will act expansively upon the piston, and when the position of the valve F' is changed to reverse the direction of the engine the valve is moved longitudinally in its casing, so that its other end will operate over the port. As the valve D has tapered or spiral edges, the cutting off of the steam can be effected as desired to suit the boiler-pressure or the work that the engine is expected to do. It will be particu-

larly noted that with a valve constructed as shown there is a direct coöperation between the two valves and the abutments.

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

1. A rotary engine having an annular piston-passage and a piston attached to a disk, in combination with a rotary abutment having an opening adjacent to its periphery which abutment is moved at a higher rate of speed than the piston, and a smaller rotary abutment or sector positioned adjacent to the first-mentioned abutment the latter turning at the same rate of speed as the piston, and means for admitting steam into the annular passage between the abutments and the piston, substantially as shown and for the purpose set forth.

2. A rotary engine having an annular piston-passage and a piston, in combination with a pair of revolving abutments which are in gear with the main shaft of the engine said abutments being adapted to intersect the piston-passage, and gearing for turning one of the abutments at a higher rate of speed than the other, for the purpose set forth.

3. A rotary engine having an annular piston-passage, a piston therein and abutments which are geared to move at different rates of speed for intersecting the piston-passage, in combination with a rotary controlling-valve which is movable to govern the admission of steam to the piston-passage, said valve having a portion which positively closes the port to the steam-passage which leads to the piston-passage when the piston is near the abutments and while it is passing the same, substantially as shown and for the purpose set forth.

4. In combination with a rotary engine, a rotary expansion-valve geared to turn at the same rate of speed as the engine, said expansion-valve having cylindrical end portions and adjacent thereto curved portions or helices, and an intermediate portion between the helices with straight edges and means for moving the valve in its casing longitudinally to provide for the admission of steam to the

piston-passage when the piston is turning in either direction and a positive cut-off when the piston is in close proximity to the abutments and while passing the same.

5. A cylindrical expansion-valve having at each end circular portions and between the ends inclined portions or helices and a part with straight edges which extends from the perimeter of one of the end portions to the perimeter of the other end portion, in combination with a casing, means for imparting a rotary movement to the valve, and means for shifting the valve longitudinally in its casing so that the same valve will operate when the engine is running in either direction.

6. A controlling-valve for the purpose set forth having near each of its ends curved portions which are tapered or inclined said portions being connected and mounted on a shaft within a casing having a port which is adapted to be covered by the parts of the valve, and means for moving the valve longitudinally over the port and rotating the same in either direction the means for rotating the valve being such that the valve will be turned in unison with the piston and a reversing-valve between the controlling-valve and the piston-passage, substantially as shown.

7. In a rotary engine, the combination of a rotary controlling-valve, a reverse-valve, both valves being located within valve-chambers or steam-chests, a port between the steam-chests over which the controlling-valve turns and governs the supply of steam to the valve-chamber of the reversing-valve, an annular piston-passage, a piston therein a rotary abutment which intersects the piston-passage, and pipes leading from the reverse-valve chamber to the piston-passage, substantially as shown.

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

MORRIS KELLER.

Witnesses:

J. G. ROSS,  
JEREMIAH KELLER.