2 Sheets—Sheet 1.

W. C. WOLFE.
Rotary-Engine.

No. 206,380. **Patented July 23, 1878.**

Fig. 1.

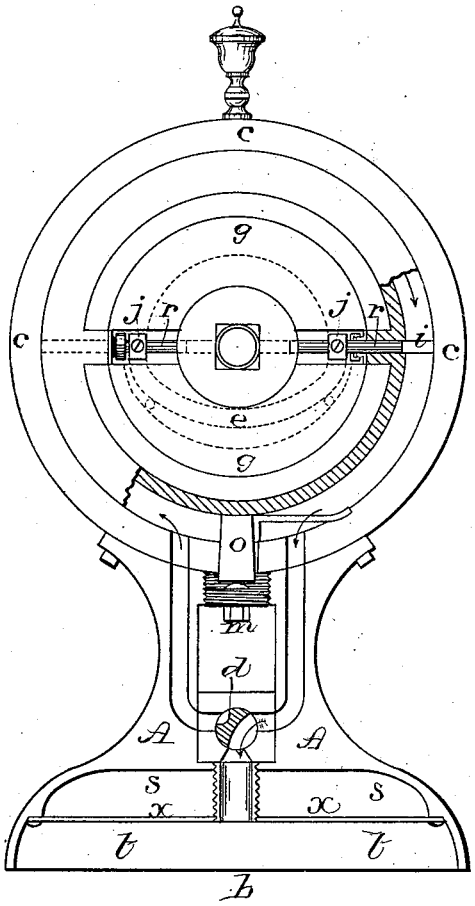


Fig. 2.

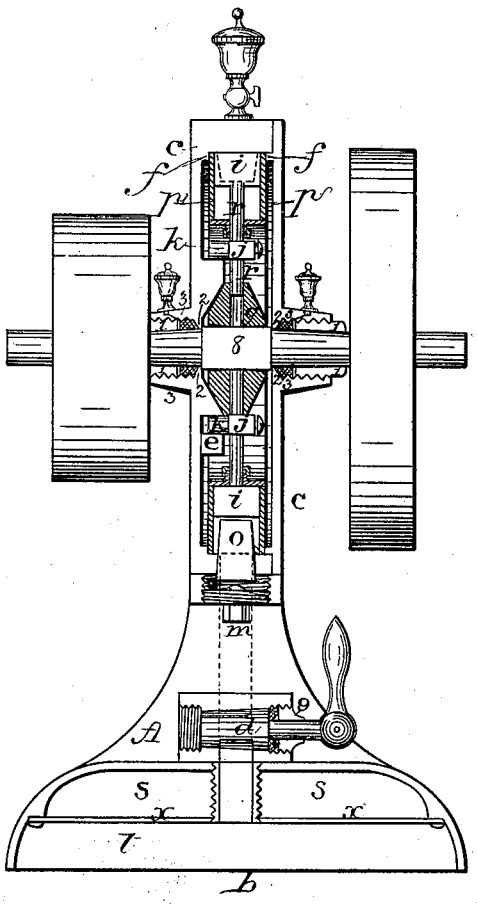
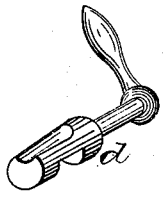


Fig. 3.



Witnesses.

J. W. Garner
L. D. Haines

Inventor.

W. C. Wolfe
per
F. A. Lehmann
Atty

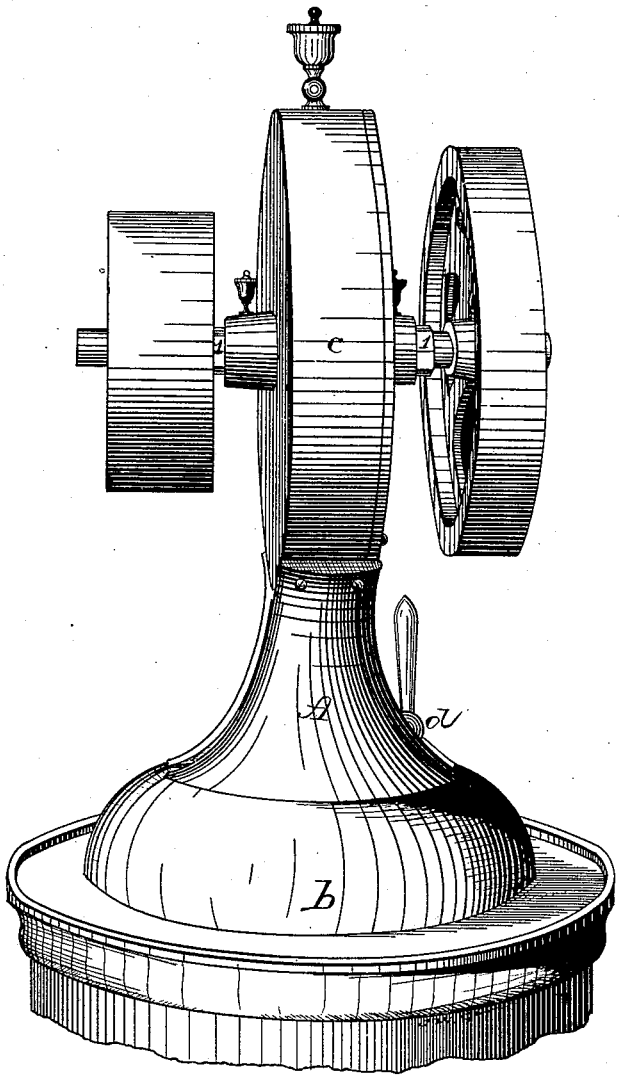
2 Sheets—Sheet 2.

W. C. WOLFE.

Rotary-Engine.

No. 206,380. Patented July 23, 1878.

Fig. 4.



Witnesses:

J. W. Garner

W. S. D. Haines

Inventor

W. C. Wolfe

per

J. A. Lehmann,

Atty

UNITED STATES PATENT OFFICE.

WILLIAM C. WOLFE, OF JOHNSTOWN, PENNSYLVANIA.

IMPROVEMENT IN ROTARY ENGINES.

Specification forming part of Letters Patent No. **206,380**, dated July 23, 1878; application filed May 18, 1878.

To all whom it may concern:

Be it known that I, WILLIAM C. WOLFE, of Johnstown, in the county of Cambria and State of Pennsylvania, have invented certain new and useful Improvements in Rotary Steam-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 pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to an improvement in rotary steam-engines; and it consists in the arrangement and combination of parts that will be more fully described hereinafter, whereby the cheapness, efficiency, and durability of the engine are increased, the friction, wear, and leakage decreased, and a better and more serviceable engine produced. This engine is also adapted to be used as a rotary pump, a hydraulic engine, an air-compressor, a blower, and for other purposes.

The accompanying drawings represent my invention.

b represents the base of the engine, upon the top of which is secured the pedestal A, which pedestal has a large transverse groove or slot cut through it, as shown. Upon the top of this pedestal is secured the case *c* of the engine, by means of bolts or any other suitable devices. Upon the base, and in between the two portions of the pedestal, is placed a valve box or chamber, in which valve *d* is located. This valve is made tapering, and fits in a correspondingly-shaped recess, while it is securely held in position by means of suitable glands 9 and packing, so as to be perfectly steam and air tight. Without this screw-gland and a suitable packing the valve will not operate. As fast as the valve-packing wears away, the gland is screwed in to take up the wear. Upon the upper side of this valve is formed a horizontal recess, and across the bottom of the valve is cut a transverse recess or groove, these two recesses or grooves being made to extend at right angles to each other. The steam is admitted through the horizontal recess of valve *d*. When the valve is turned so that the handle is inclined to the left, the steam passes through the left side of the pedestal, up into the case *c*, and the steam, after having passed around the circuit of the case, is exhausted through the eduction-port in the right side of the pedestal. When the handle of the valve is turned so as to incline toward the right, the motion of the engine is reversed, and the steam passes through the induction-port in the right side of the pedestal, and escapes down through the eduction-port in the left side of the pedestal.

Upon the inside of one of the heads of the casing *c* is formed a cam, *e*, by means of which the valves are drawn inward, so as to raise them upward and over the abutment as they revolve around with the wheel. Upon both the heads are formed the fillets or flanges *f*, around the extreme outer edges of the inside of the case, for the purpose of forming a tight joint with the corresponding outer surfaces of flanges *p* upon the wheel.

The propelling-wheel *g*, in which the pistons *i* are placed, is secured to a tapering shaft, S, which shaft passes through suitable glands or stuffing-boxes 1 in the heads of the casing, so as to cause it to move steam and air tight. This shaft is made square at its center, where it passes through the wheel, and from this square part it tapers toward each end, forming journals, the interior of the glands being correspondingly shaped. To prevent any eccentricity of the shaft arising from neglect in screwing up the boxes, or from any other cause, and any friction caused by the wheel *g* in revolving in the case, the wheel is placed loosely on the shaft, and the opening in the wheel through which the shaft passes is made somewhat larger at each end than in the middle. By thus enlarging the opening at the ends the shaft can vary somewhat from its true position without affecting the wheel, and thus the wheel will revolve evenly and truly under all circumstances, which it might not do were it secured to the shaft, or no provision made for a slight eccentricity of the shaft.

The hubs 3 are formed on the outside of the heads of the case *o*, and have the flanges 2 formed in their inner ends, against which the packing is screwed. In the outer end of the hub are secured the glands 1, which have their outer ends made octagonal and of smaller diameter than the threaded part, so as to permit the gland to be screwed entirely in in tak-

ing up the wear. The outer ends of these glands project beyond the ends of the hubs, and as the screw-threads are not visible a finished appearance is thereby given the engine. Between the inner ends of the glands and the packing is placed the washer 4, which prevents the packing from turning around with the gland when the gland is being screwed into the hub. By this arrangement the shaft is not only maintained in the center, but all wear is compensated for until the bushing is screwed entirely in after repeated turning, when it can be easily replaced by another.

The propelling-wheel *g* has in its circumference a groove with tapering sides, as shown, formed by two flanges, *p*, which taper outward on their inner edges, the space between them forming the groove, while their outward edges are straight and flush with the rim of the wheel. Working back and forth through the edges of this wheel, upon opposite sides of it and within the groove, are the two pistons *i*. These pistons have rods *r*, projecting toward the center of the wheel through suitable stuffing-boxes, and to these rods are fastened the blocks *j*, which can be adjusted back and forth by means of set-screws. Projecting from the opposite sides of the blocks from the set-screws are the studs or projections *k*, attached to the rods *r*, and these studs catch in the cam and cause the piston to rise upward and over the abutment *o*, as already described. These blocks move back and forth with the pistons in slots cut through the propelling-wheel, and serve to take up any wear of the pistons, as well as to control their movements. The outer ends of these pistons fit snugly against the inside surface or periphery of the casing against which they move, and, by means of the flanges *p* upon the wheel and the fillets or flanges *f* on both sides of the casing, form steam and air tight joints. As these pistons wear away they can be adjusted outward by means of the blocks, so as to compensate for all wear by friction.

Passed up into the casing, through a hole through the pedestal and bottom of the case, is the tapering abutment *o*, which is made of soft metal, and serves to separate the eduction and induction ports of the engine. In order not only to hold this abutment in position, but to adjust it upward, as it may wear away by the friction of the wheel upon it, the hole through which it is passed is closed by the screw-plug *m*, as shown.

When it is desired to adjust this abutment while the engine is in motion, or at any time, it is only necessary to apply a wrench to the end of the nut, and the abutment can be moved upward to any desired degree.

In order to prevent the pistons from ever striking against the abutment, in case they should give way from any cause, a projection can be placed upon each side of it, so as to cause the pistons to rise upward, should the cam fail to raise them. By thus using a screw-plug and making this abutment adjustable, a very great gain and advantage are derived in adjusting the friction and wear of the engine, and in rendering it perfectly tight.

The cam-groove, as here shown, is formed of an ellipse and a circle; but any other shape or form which causes an abrupt deviation from the line of travel of the pistons as they near the abutment may be used instead. This engine will be provided with a lubricator upon its top, for lubricating the pistons, a lubricator upon each bearing of the shaft, and a cock to allow the condensed steam to escape, all of which may be of any desired form or construction that may be preferred.

Upon the base of the engine is bolted a plate, *x*, having a short pipe screwed into its center, and connected with the exhaust-port of the engine. The space *s*, inclosed by the plate and engine-base, forms a chamber or heater, through which the feed-water is forced or drawn before entering the boiler. Beneath this chamber *s* is formed a second one, *t*, connecting with the exhaust-pipe through a hole in the base-plate of the engine, or at the side of the base of the engine. Into this lower chamber the exhaust-steam is discharged, which comes in contact with the under surface of the floor of the chamber above it, and the feed-water contained therein is thereby heated. This chamber may also be used for a condenser by discharging into it a small quantity of water in the form of a shower, and delivering this heated water and condensed steam into the boiler. This plate *x* will only be used when the engine is not placed upon the top of the boiler. When the engine is on top of the boiler the exhaust-steam will pass, by means of the exhaust-pipe, through the top of the boiler and escape up the stack, while the feed-water, in passing through the chamber formed by the base of the engine, will be heated by the top plate of the boiler. As the feed-water passes through the base of the engine it prevents the heat from the boiler from overheating the engine.

Having thus described my invention, I claim—

1. In a rotary engine, the hollow base *b*, forming a chamber through which the feed-water passes on its way to the boiler, the water being heated from the top plate of the boiler, substantially as shown.

2. A rotary engine having a hollow base, *b*, in which is secured the plate or partition *x*, to form the chamber *s*, for the purpose of heating the feed-water by means of the exhaust-steam, substantially as described.

3. The combination of the pedestal A, having a transverse opening through it, and driving-wheel *g*, having a tapering groove in its outer edge, with the tapering abutment *o*, passed up through the bottom of the case into the said groove, and held in position by the screw-plug *m*, substantially as set forth.

4. The driving-shaft S, made square at its center, in combination with the driving-wheel *g*, having the opening through its center made

larger at the ends than the center, so as to allow the shaft a slight movement without affecting the wheel, substantially as specified.

5. In a rotary engine, the combination of the tapering shaft 8, hubs 3, having the flanges 2 in their inner ends, and glands 1, the glands being provided with heads that are smaller in diameter than the bodies, so that the glands can be screwed their whole length into the hub, substantially as shown.

6. The piston-rods *r*, having the adjustable blocks *j* attached thereto, in combination with the cam *e*, substantially as described, as a means of adjusting the pistons in and out.

7. The combination of the base A, having a transverse slot through it to receive the valve-box, with the tapering valve *d*, having a longitudinal groove to receive the steam, and a transverse groove to discharge the exhaust-steam, all arranged and constructed to operate, in a rotary engine, substantially as described.

In testimony that I claim the foregoing I have hereunto set my hand this 30th day of April, 1878.

WILLIAM C. WOLFE.

Witnesses:
JOHN HENDERSON,
JOHN WIDMANN.