



# UNITED STATES PATENT OFFICE.

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## ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 261,215, dated July 18, 1882.

Application filed July 23, 1880. (No model.)

*To all whom it may concern:*

Be it known that I, VANDERLYN H. FELT, of Kendall, Orleans county, New York, have invented a certain new and useful Improvement in Rotary Engines; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, in which—

Figure 1 is a longitudinal section of the engine in line *xx* of Fig. 2. Fig. 2 is a horizontal section in line *yy* of Fig. 1. Fig. 3 is a plan with the top removed, looking down from line *zz* of Fig. 1. Fig. 4 is a perspective view of one of the abutments removed from its arm.

My improvement relates to rotary engines in which two eccentric pistons working on the same shaft are used, and a slide-valve is employed which alternately covers and uncovers the ports which admit the steam.

The invention consists in a peculiar construction of the pistons and their connecting parts, as hereinafter more fully described.

In the drawings, *A A* are the two eccentric pistons, attached to the single shaft *B*, and revolving in separate chambers of the cylinder. Each of the pistons has a thin packing, *a*, set radially into a groove in the periphery of the piston, its outer edge resting against the side of the chamber, as clearly shown in Fig. 1.

*C C* are two arms, pivoted at *b b* so as to move up and down, and *D D* are blocks forming abutments, connected with the arms by joints or hinges, and having concave faces which fit closely on the periphery of the pistons and prevent the steam from escaping past them to the exhaust. The abutments rise and fall with the pistons as the latter revolve, and always preserve their contact.

*c c* are heads of the arms, made concentric with the pivots *b b*, and working closely within concentric portions of the chambers above the pistons.

*d d* are thin packings, set into the concentric portions of the chambers and bearing against the concentric heads. By this means two packing-surfaces are made—first, of the abutments on top of the pistons, and, second, of the arms *C C* in the chambers above the pistons. This is necessary, since a portion of the steam passes over the abutment as it moves up and down with the eccentricity of the pis-

ton, and if the arm were not packed above the steam would pass over and escape into the exhaust.

*ff* are the induction-valve openings admitting live steam to the two chambers.

*g* is a slide-valve, which rests above the openings and alternately covers and uncovers them. The slide-valve is connected by a link, *h*, with an arm, *i*, of a rock-shaft, *k*, operated by suitable lever-work connected with the main shaft. As the slide-valve is operated it admits steam alternately to the two chambers.

*l* is a slot in each piston, extending from the outside toward the center in a radial direction, and extending across the whole width of the piston. *m* is a cavity in the face of the piston, back of the slot, and communicating with it, as shown in Fig. 1. The slot and the cavity lie directly back of the packing *a*, before described. The moment the packing *a* passes from under the abutment *D* the steam enters the slot *l*, and from thence passes back into the cavity *m*, which is then under the foot of the abutment, and by this means the great pressure of the steam on the top of the abutment is to a certain extent balanced by the pressure of the steam on the under side of the abutment, enabling the piston to move with greater ease and freedom at the instant when the steam has the least pressure upon the piston itself. The steam, by thus extending back under the abutment, also gets greater surface for pressure upon the piston forward of the shaft than it could get simply between the forward end of the abutment and the packing *a* if the slot and cavity were not used, so that at the moment the packing passes the steam-port additional force is obtained to drive the piston forward at the moment when it is most needed.

*n* is an exhaust-port at the rear of the piston and abutment, which allows the steam to escape when the piston is forced around to proper position. The induction-port *f* of each chamber is opened by the slide-valve at the moment that the packing *a* has passed the forward end of the abutment, and it remains open till the piston has made a partial revolution, when it is closed, and the piston is then further forced around by the expansive action of the confined steam till the exhaust is finally reached.

*G G* are the two opposite sides of the case,

which are connected by screw-rods *p p*, so that by turning up nuts on the screw-rods the sides are made to clamp more or less tightly against the sides of the pistons, the arms, and the abutments. The sides of the piston, arms, and abutments, and also the inner faces of the sides *G G*, are planed perfectly smooth, so that when the loose side pieces, *G*, are brought up against the working parts an accurate fit is made and a perfect packing produced, which will prevent the escape of steam.

*r r* are loose rims fitting in circular grooves in the sides *G G*, and forming the periphery of the cylinder. The circular grooves are of such depth as to allow the sides to be properly clamped against the pistons, arms, and abutments, as before described.

Having described my invention, I claim—

1. In a compound rotary engine provided with two cylinders, two eccentric pistons, and a slide-valve, the pistons *A*, constructed with a slot, *l*, and cavity *m* in its periphery, the cavity extending back under the abutment and allowing entrance of steam therein at the moment the packing passes the forward end of the abutment, as shown and described, and for the purpose specified.

2. In a rotary engine provided with two cylinders, two eccentric pistons, and a slide-valve, the combination, with the eccentric piston *A*, of the arm *C* and abutment *D*, the abutment being jointed to the arm so as to pack on the piston, and the arm being provided with a head, *c*, concentric with its pivot and resting against a packing, *d*, of the chamber, whereby a packing is made for the arm above the abutment, as shown and described, and for the purpose specified.

3. In a rotary engine, the combination, with the pistons *A A*, arms *C C*, and abutments *D D*, of the two loose sides *G G*, connected by screw-rods *p p*, and the loose circular rims *r r*, fitting in grooves of said sides, whereby the casing of the engine can be made to clamp to the sides of the pistons, arms, and abutments to pack the same, as herein shown and described.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

VANDERLYN HOWARD FELT.

Witnesses:

CHAS. A. FELT,  
LYSANDER B. FELT.