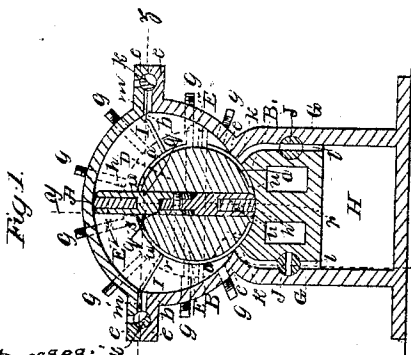
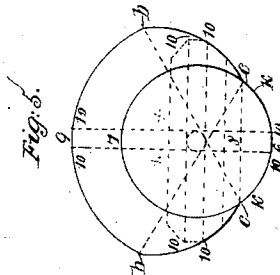
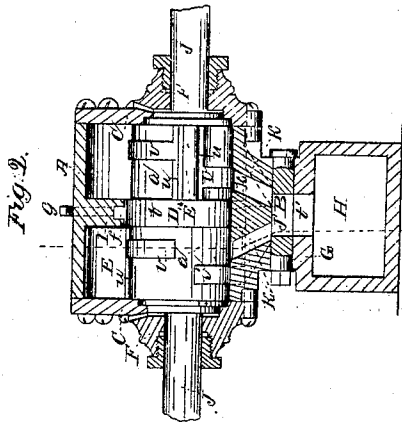
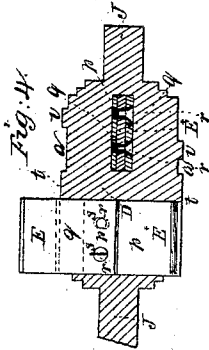


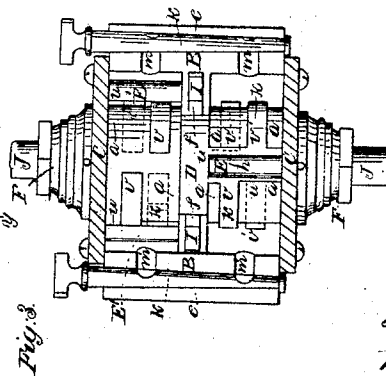
A. F. REEDER.
ROTARY STEAM ENGINE.

No. 28,305.

Patented May 15, 1860.



Witnesses:
J. W. Crockett &
R. S. Spencer.



Inventor:
A. F. Reeder
per Munn & Co.
Atty.

UNITED STATES PATENT OFFICE.

A. F. REEDER, OF BLOOMINGTON, ILLINOIS.

ROTARY ENGINE.

Specification of Letters Patent No. 28,305, dated May. 15, 1860.

To all whom it may concern:

Be it known that I, A. F. REEDER, of Bloomington, in the county of McLean and State of Illinois, have invented a new and Improved Rotary Engine; 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, forming part of this specification, in which—

Figure 1, is a vertical section of an engine constructed according to my invention taken transversely to its axis as indicated by the line x, x , in Fig. 2. Fig. 2, is a vertical section of the same taken parallel with the axis as indicated by the line y, y , in Fig. 1. Fig. 3, is a horizontal section of the same in the plane indicated by the line z, z in Fig. 1. Fig. 4 is a central longitudinal section of the rotary piston head. Fig. 5 is a diagram illustrating the construction of the cylinder or steam casing.

Similar letters of reference indicate corresponding parts in the several figures.

A B C C, is the cylinder or steam casing of the engine D the rotating piston head and E, E*, E', E'*, are the pistons. The portion of the revolving piston head included within the steam cylinder A B C C, is turned truly of cylindrical form but provided with shallow cavities, a, a in its periphery as will be presently more fully described, and it is fitted and keyed to a concentric shaft provided with journals or is furnished at its end with journals to constitute the main shaft J of the engine and such shaft is fitted to stuffing boxes F, F, in the cylinder heads C, C. The section of the cylinder taken perpendicularly to the axis of the piston head is of the form of two arcs bb , and cc , Figs. 1 and 5, of different radius, both concentric with the said axis, united by two concentric arcs bc , bc . The arc formed portions of the cylinder, are cast in two flanged pieces, viz., the larger concentric portion bb , in one piece A, and the arc formed portions cc, bc, bc in another piece B, which may be cast with or bolted with the base G, containing the steam chest H. The pieces A, B, are bolted together by bolts passing through their flanges e, e and the heads C, C, are bolted to their ends. The arc cc constitutes the face of the abutment and the space included between the arcs bb , bc , bc , and the periphery of the cylinder head constitutes the steam space in which the steam acts upon the piston to produce the

rotary motion of the piston head and shaft. This steam space is divided into two chambers of equal capacity by a partition I, which is cast partly with the piece A, and partly with the piece B and which is grooved to receive packing f which is held tight against the periphery of the piston head by set screws g, g , screwing into the said partition from the exterior of the steam cylinder.

The pistons E, E*, E', E'*, of which there are four are attached together in pairs, each pair being fitted to slide radially to the axis of the rotary piston head D in one of two slots made through the piston head, one pair working on one side, and the other pair on the other side of the partition I, and one pair being arranged at right angles to the other as shown in Fig. 1, where the pair E, E*, is represented in section and the pair E', E'*, in dotted outline and also shown in Fig. 4. The pistons are made of such width as to fit between the sides of the partition I, and the inner sides of the cylinder heads C, C, and of such length as to fit between the arcs aa , and bb , and between the two arcs bc , bc , and are fitted with packing h, h to keep them tight. In order to enable them to be set out lengthwise when they have worn loose, each pair is composed of three pieces p, q, q , as shown in Figs. 1 and 4, the piece p being made with a tongue p' , and the pieces q, q , being fitted together with a recess in the inner face of each, to fit the said tongue, and the three pieces being secured together by screws r, r , passing through the said tongue and corresponding parts of the pieces q, q . The holes s in the tongue p' which receive the said screws r, r , are elongated in such a manner, shown in Fig. 4 that the pieces p, q, q , can be moved endwise relating to each other.

k, k , and k', k' , are the induction parts two on each side of the partition I, near the terminations of the arc cc , the two k, k communicating with a cock J and the other two k', k' , with a cock J', each of which cocks connects its respective two ports with a single passage l or l' , opening from the steam chest H. m, m , and m', m' are the induction ports two on each side of the partition I, at the junctions of the arc bb , with the two arcs bc , the two m, m being fitted with a cock K, and the two m', m' with a cock K'. The two sets of ports are provided to permit the engine to be driven in

either direction, and only one set of ports is open at a time, the other set being closed by its respective cocks.

In Fig. 1, the cocks J' and K' , are represented open and, J and K , closed in which condition the pistons will be driven in the direction of the arrow shown in that figure.

The before mentioned cavities a , a , in the periphery of the cylindrical piston head D , are exhibited more or less fully in all the figures but Fig. 5. The said cavities are of such form as to leave of the full size of the cylinder only a band t , of the width of the partition I , a narrow face u at each edge of each slot through which the piston pass, and a number of narrow strips v and v' of which one runs of a circumferential direction from each face, u one on each side of each piston, the strips v ranging with the induction ports k and those v' with the induction ports k' . The cavity a forms a passage for the steam from the induction ports to the edges of the face of the abutment c c into the chambers in which the steam acts upon the pistons. The strips v v serve to keep the ports k , k , closed, till their respective pistons after passing the said ports in their revolution in the opposite direction to the arrow shown in Fig. 1, arrive in contact with the arc bb and the strips v' v' serve to keep the ports k' k' closed till the pistons arrive in corresponding positions in their revolutions in the opposite direction.

The pistons while in contact with the arc bb are acted upon by the pressure of steam to produce a rotary motion for the rotating head D , and its shaft in one direction or the other according to the position of the cocks J , J' , and K K' . As each piston passes from the arc bb along one of the arcs bc it is forced inward toward the axis of the head D and so caused to force out the opposite connected one so that it may come in contact with the arc bb , when it arrives opposite to it. The two pairs of pistons being at right angles to each other, one is always subject to the action of the steam, and the rotary motion is kept up without intermission.

In constructing the cylinder A B C C , I have found it best to adopt the following rule to obtain its transverse sectional form.

I first describe a circle of the same diameter in the cylindrical exterior of the piston head and draw through its center the vertical line 6, 7, as shown in Fig. 5, and on this line set off from the circumference the distance 6, 8 equal to one fifth of the diameter for the height of the abutment, and through the point 8 draw the horizontal line c , c , to obtain the arc cc , shown in Fig. 1. On this arc I set off two points k k' at 90° apart and at equal distances from the end of the arc, for the centers of the induction passages. Then having decided upon the thickness of the sliding pistons I describe from the center of the first mentioned circle of a diameter equal to one-third of such thickness. I next with one third of the diameter of the circle already described set off from the point 7, the distance 7, 9, for the depth of the steam chamber, and continue the line 6, 7, to the point 9, and from the center of the circle, describe the arc bb , through the point 9, obtaining the length of the said arc by drawing the lines cb , cb , from the points c , c , touching the diameter of the small circle. I then draw the parallel lines 10, 10, from the arc cc toward the arc bb , touching the smaller circle, and unite the said lines by an arc of the same radius as the arc cc , touching the arc bb , and afterwards draw the figure 10, 10, in the transverse position, shown in red lines and through the three points b , c , and 10, on each side of the figure describe the arcs bc , bc . The outer third portions of the thickness of the pistons are to be rounded off in such a manner as to clear the arcs bc .

I do not claim the construction of the steam cylinder of two concentric arcs, united by two eccentric arcs, but:

What I claim as my invention and desire to secure by Letters Patent, is—

The engine constructed with a cylinder of the form described with a partition I , with the induction ports in its abutments, and with a cavity a , and series of projecting surfaces t , u , v , v' , in and upon its rotating piston head, D , substantially as herein described.

A. F. REEDER.

Witnesses:

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M. N. LARRIMARE.