

(No Model.)

W. & A. BERRENBURG.

ROTARY ENGINE.

No. 337,551.

Patented Mar. 9, 1886.

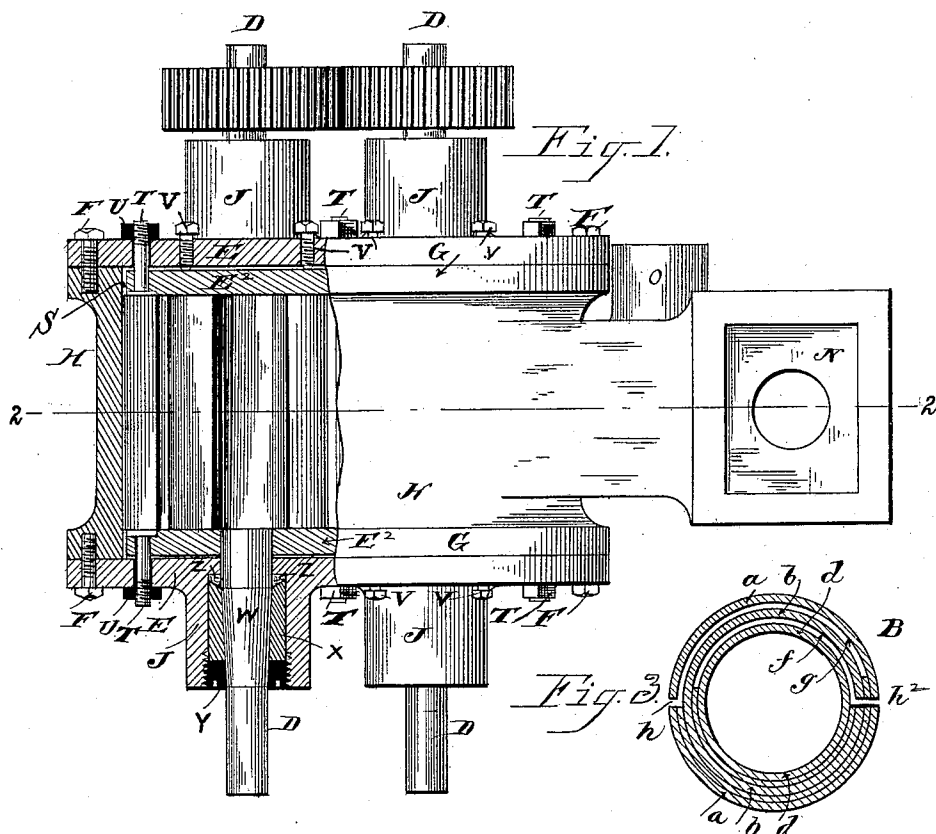


Fig. 3.

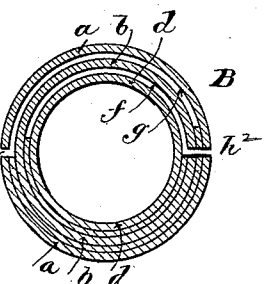
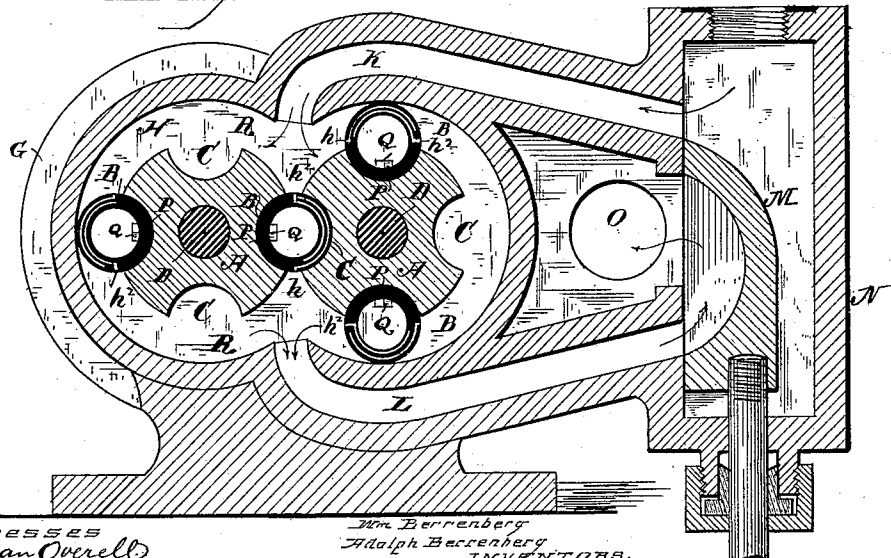


Fig. 2.



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# UNITED STATES PATENT OFFICE.

WILLIAM BERRENBURG AND ADOLPH BERRENBURG, OF BOSTON, MASSACHUSETTS, ASSIGNORS TO THE POSITIVE PUMP AND WATER METER COMPANY, OF KITTERY, MAINE.

## ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 337,551, dated March 9, 1886.

Application filed July 13, 1885. Serial No. 171,518. (No model.)

*To all whom it may concern:*

Be it known that we, WILLIAM BERRENBURG and ADOLPH BERRENBURG, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Rotary Engines, of which the following is a full, clear, and exact description.

This invention relates to duplex or two-shaft rotary engines having intermeshing rotary pistons or cams; and it consists, in substance, in constructing the teeth of such pistons or cams separate therefrom and detachably attaching them thereto, and in constructing said teeth for steam to be admitted to them, and from its pressure within them to expand them radially, and thus keep them in close bearing with the casing in which the pistons or cams rotate; in a construction of either head of the piston-casing in two separate thicknesses, an outer and an inner, and the two attached, and the outer lapping over and secured to, and the inner preferably closely fitting within the opening of, the end of the casing and contiguous or next to the end of the pistons or cams, in combination with screws or their equivalents, which are entered into and through the outer, and are arranged and all so as to enable the inner to be set up or adjusted in position relative to the ends of the pistons or cams, first having loosened its attachment to the outer, and then after such adjustment to be secured in its so-adjusted position by tightening up its said attachment to the outer, all substantially as hereinafter described.

In the accompanying drawings, forming a part of this specification, Figure 1 is in part a plan view and in part a horizontal section. Fig. 2 is a vertical section on line 2 2, Fig. 1. Fig. 3 is a view in detail, on an enlarged scale, of a tooth of the rotary piston detached.

In the drawings, A A represent two cams or pistons. Each piston has two teeth, B B, and two depressions or grooves, C C, all of similar and corresponding semicircular shape, and each is attached to and carried by a separate axle or shaft, D, each of which passes through and turns in the heads or ends E, each

made double, or in two parts or layers, E E<sup>2</sup>, 50 as hereinafter described, and the part E, secured by screw-bolts F to the flanged and open ends G of the piston casing or cylinder H, and also passes through and turns in a stuffing-box, J, all not only as to construction, but also as to operation from the admission of steam to the piston-cylinder through either of the steam-ports K L, according as either the one or the other is opened, from the adjustment or set of the slide-valve M in the steam-chest N, and its escape therefrom at the exhaust-port O, except as hereinafter described, the same as ordinary and well known in this class of engines, and therefore needing no more particular description herein. Each piston-tooth B is made 65 of a tube and separate from its piston, which has a semicircular seat, P, to receive it, and to which it is attached by a screw bolt or bolts, Q, passing through it and screwing into the piston, and thus each tooth is made attachable and detachable at pleasure, thereby enabling a tooth or teeth to be conveniently removed and replaced at pleasure, should it become necessary or desirable from its wear or from other cause. Again, each piston-tooth in its acting part proper—that is, in its part directly projecting from the piston and intermeshing with the grooves of the other piston as the two pistons rotate—is in three separate concentric layers or thicknesses, a, b, and d, which 80 are all continuous with the remainder or attached part of the tooth, and have two concentric spaces, f g, between them, the one, f, inside of the other, g, and closed each to the other, but each having a separate port, h h<sup>2</sup>, making communication between it and the chamber R of the piston-casing H, and in which the pistons rotate, and to which steam is admitted as stated. These ports h h<sup>2</sup> are on opposite sides of the tooth, and thus in the operation of the engine, and whether steam is admitted to the piston-cylinder at either of its inlet-ports K L, communication is had for the steam so entered into the piston-casing to enter into either the space f or the space g, as the case 95 may be, of the piston-teeth.

Admission of steam to the spaces of the teeth as above stated—the separate layers of each

tooth, being sufficiently flexible or elastic therefor—secures an outward or radial expansion of each tooth as the pistons rotate, and consequently operates to keep the teeth to a close bearing and contact with the periphery of the piston-casing as the pistons rotate therein. The inner layer or part,  $E^2$ , of the double head  $E E^2$  to each end of the piston-casing fits within the opening  $S$  of the casing, and lies next to (preferably in close contact with) the ends of the piston-heads  $A$ , and by bolts  $T$ , attached to it, and passing loosely through the outer part,  $E$ , and a screw-nut,  $U$ , applied to each bolt, it is attached to said outer part,  $E$ .

$V V$  are a series of set-screws screwing through the outer layer or part,  $E$ , of each double head  $E E^2$ , and brought to a bearing against the inner part,  $E^2$ . Loosening the attachment of the inner head,  $E^2$ , to the outer head,  $E$ , by properly turning the screw-nuts  $U$  therefor, the inner head can then be adjusted as to its bearing upon or position in relation to the ends of the pistons  $A$  by turning the set-screws  $V$  in or out, as may be necessary, and then the inner head secured in its so-adjusted position by turning the screw-nuts  $U$  to a close bearing against the outer head.

The construction of the heads to the piston-casing and their attachment to each other and to the casing herein described enables each head to be adjusted in its bearing against the end of the pistons or cams from time to time, to compensate for wear, or other reason, as may be desired, and without its detachment from the piston-casing.

The portion  $W$  of each piston shaft  $D$ , within its stuffing-box  $J$ , is of a conical shape, and has its bearing in a similar conical-shaped metal boxing,  $X$ .

$Y$  is an annular screw nut screwing into the outer end of the stuffing-box  $J$  and bearing against the outer end of the metal boxing  $X$ , which, at its inner end, rests against a yielding cushion,  $Z$ , preferably a packing of india-

rubber or other suitable elastic material, located at the inner end of the stuffing-box.

The contact of the metal bearing-box  $X$  with the piston-shaft  $D$  is regulated by the turning in or out of the screw-nut  $Y$ , as is plain on inspection of the drawings and from the description given.

The invention herein described is not to be limited to the use of steam alone, but is to be applied to water or otherwise, according as it may be found applicable.

Having thus described our invention, we claim—

1. The combination, with rotating intermeshing pistons or cams of otherwise ordinary or suitable construction and arrangement, of teeth  $B$ , separately made, and each of a tube fitted within a seat,  $P$ , of and attached to the piston, substantially as described, for the purpose specified.

2. The combination, with rotating intermeshing pistons or cams of otherwise ordinary or suitable construction and arrangement, of teeth  $B$ , constructed substantially as shown, for the admission of steam thereto, and thereby to be expanded, substantially as described, for the purpose specified.

3. The combination, with rotating intermeshing pistons or cams of otherwise ordinary or suitable construction and arrangement, of teeth  $B$ , made in expansible layers  $a b d$ , separate by spaces  $f g$ , each closed to each other but having a separate port,  $h h^2$ , making communication with the chamber  $R$  of the piston-casing  $H$ , substantially as described, for the purpose specified.

In testimony whereof we have hereunto set our hands in the presence of two subscribing witnesses.

WILLIAM BERRENBURG.  
ADOLPH BERRENBURG.

Witnesses:

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