

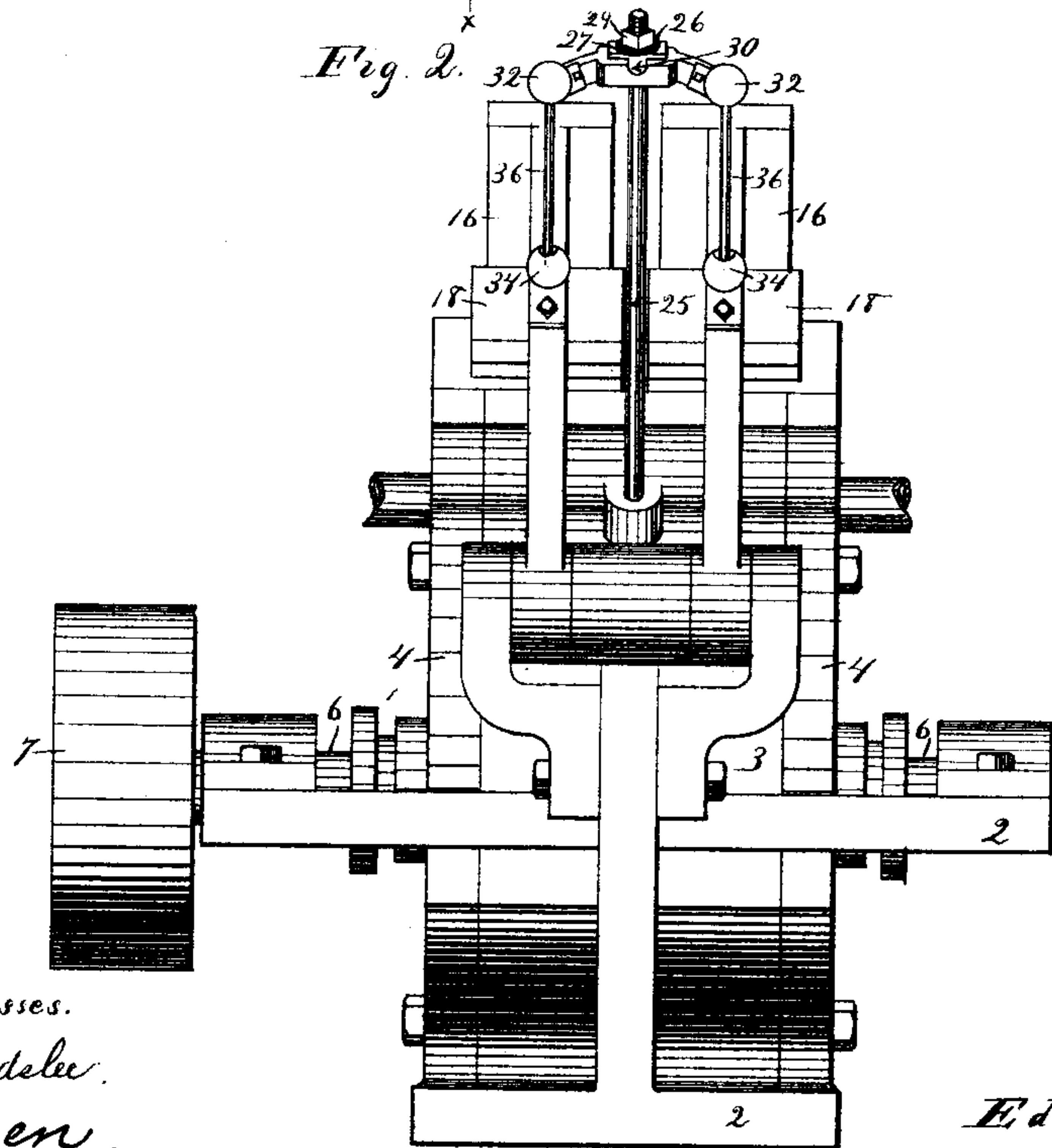
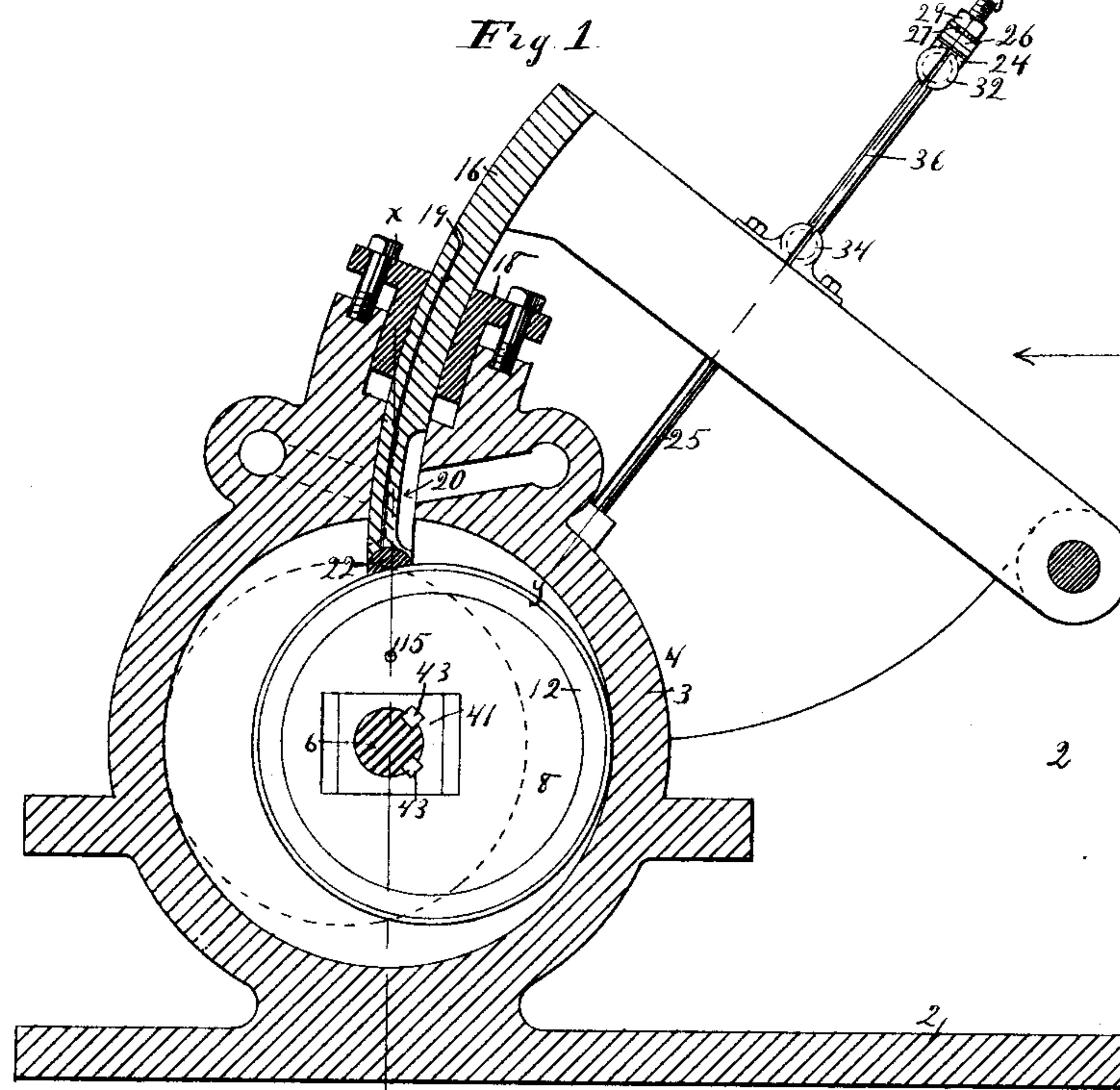
(No Model.)

2 Sheets—Sheet 1.

E. E. THOMAS.
ROTARY ENGINE.

No. 387,606.

Patented Aug. 7, 1888.



Witnesses.

S. J. Beardslee.
J. Jensen.

Inventor.

Edwin E. Thomas.

By A. C. Paul, Atty.

(No Model.)

2 Sheets—Sheet 2.

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Fig. 3.

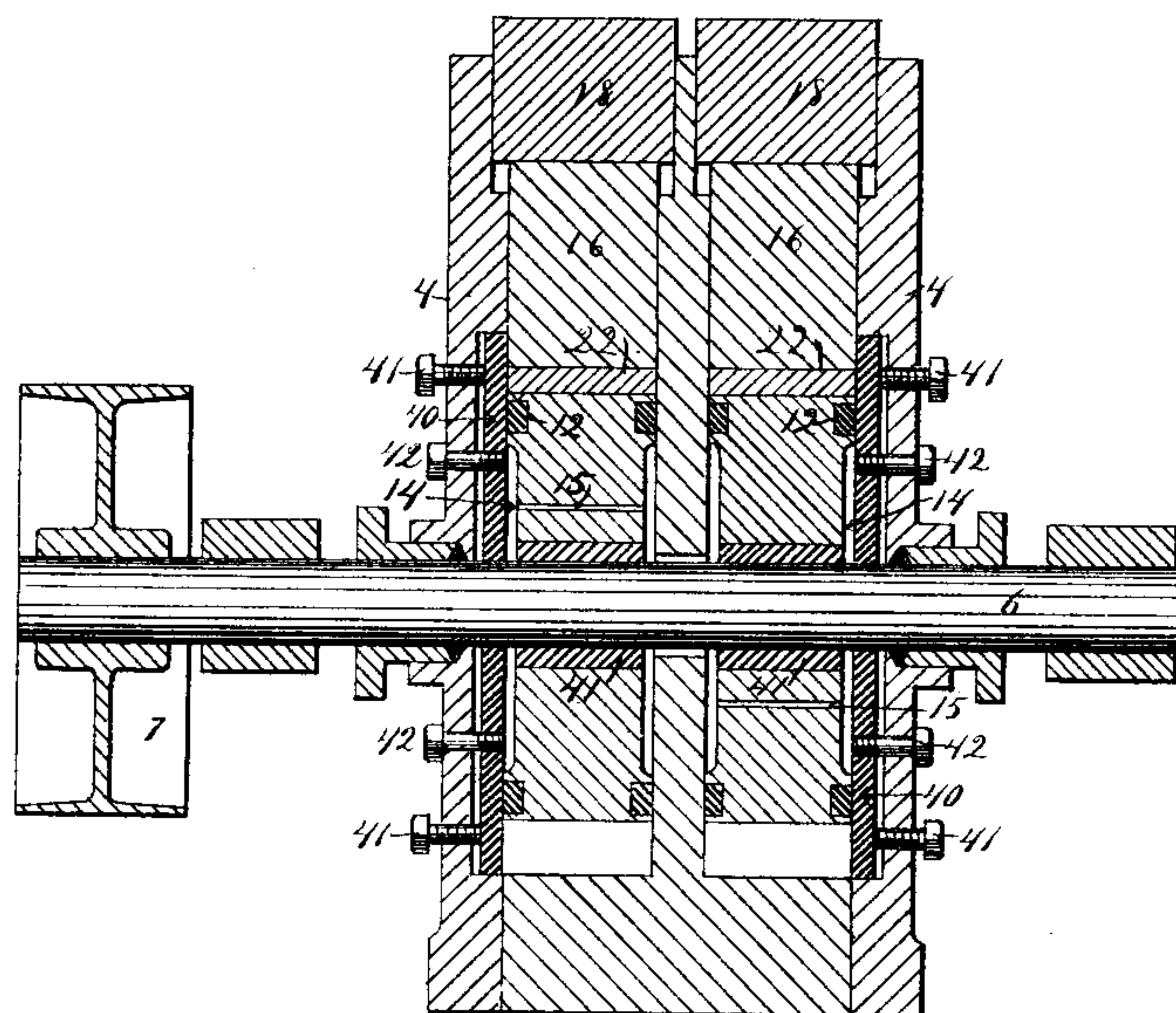


Fig. 4.

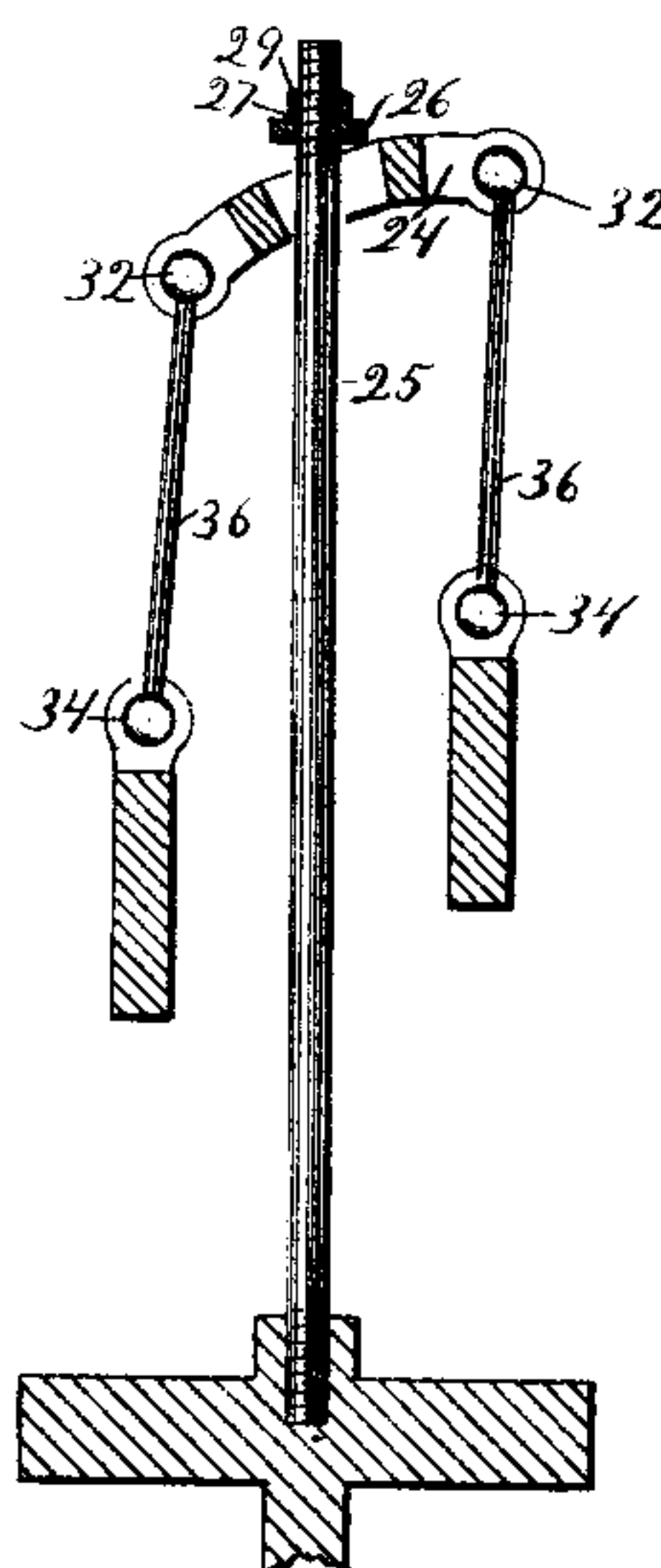
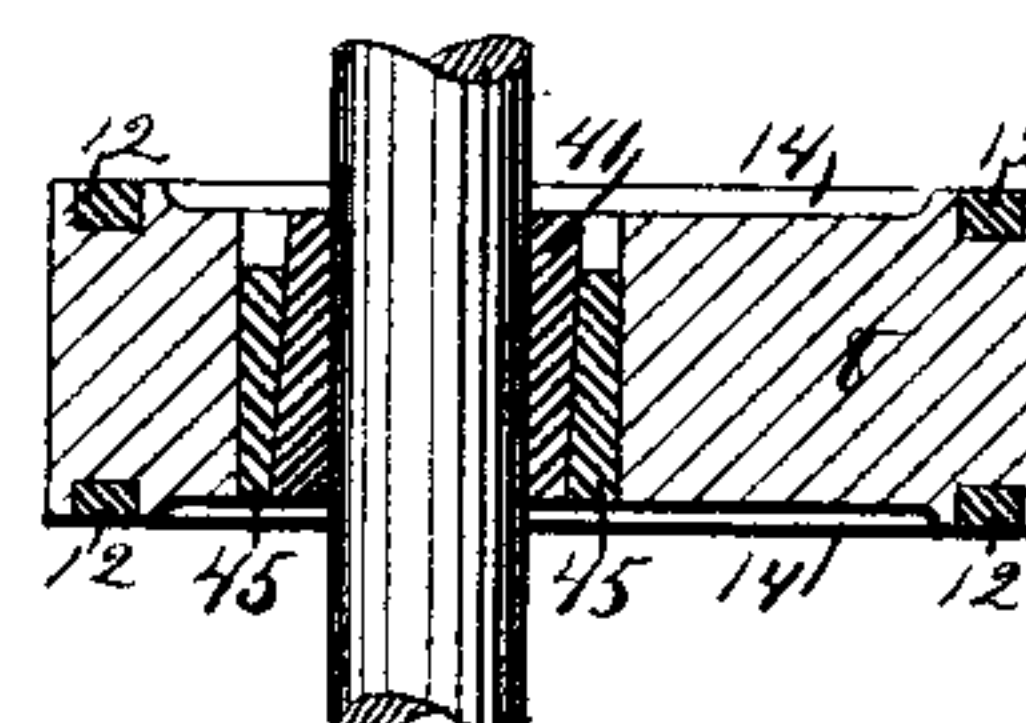


Fig. 5.



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UNITED STATES PATENT OFFICE.

EDWIN E. THOMAS, OF MINNEAPOLIS, MINNESOTA.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 387,606, dated August 7, 1888.

Application filed July 13, 1887. Serial No. 244,147. (No model.)

To all whom it may concern:

Be it known that I, EDWIN E. THOMAS, of Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Rotary Engines, of which the following is a specification.

My invention relates to certain improvements in the class of rotary engines and the construction thereof for which I have already made application for Letters Patent of the United States; and the object I have in view is to simplify this construction and make a machine which will be more effective in its operation.

To this end my invention consists, generally, in the construction and arrangement of parts hereinafter described, and particularly pointed out in the claims.

In the drawings which form a part of this specification, Figure 1 is a vertical section of my improved rotary engine, taken through the cylinder, showing the piston in full. Fig. 2 is an end elevation looking in the direction of the arrow in Fig. 1. Fig. 3 is a vertical cross-section on line *x x* of Fig. 1. Fig. 4 is a detail section on line *y y* of Fig. 1. Fig. 5 is a detail of one of the pistons.

2 represents the bed-plate of the machine, which supports the cylinder 3. This cylinder is divided transversely by a suitable partition, making two compartments in the said cylinder, each of which is covered by a head, 4. These heads are carefully bored and fitted to receive a central shaft, 6, which passes centrally through the two compartments in the cylinder, and is provided with suitable stuffing-boxes in each head to prevent the escape of steam. The shaft 6 extends beyond the cylinder on either side, and is supported in suitable bearings in the frame 2. This shaft is also provided with a driving-pulley, 7, for transmitting power from the machine. A piston, 8, is placed in each of the compartments of the cylinder, and is preferably secured to the driving-shaft by splines or feathers to allow its being readily removed from the cylinder. The pistons 8 are mounted eccentrically upon the shaft and diametrically opposite to each other, the full side of each bearing against the inner wall of its cylinder or compartment, and provided at this point with a suitable device,

as hereinafter described, by which the piston is set out and the full side always kept in contact with the cylinder in order to take up the wear and prevent leakage around the pistons. The pistons are also provided with a packing-ring, 12, held against the head and partition by suitable springs, to form a steam-tight joint between the piston and the cylinder.

I prefer to construct a shallow recess, 14, in the two ends of the pistons, extending from the center outward nearly to the packing-rings. An opening, 15, is drilled or bored through the piston, connecting the two recesses. The object of this is to equalize any pressure which may be brought against the piston within the circle protected by the packing-rings, which might occur from leakage of steam around the ring upon one side more than on the other. This might cause a pressure against the piston on this side and force it against the opposite wall of the cylinder and cause undue friction. By forming the recesses, as above described, and connecting the two by means of the opening, any pressure of steam admitted upon one side will be transferred upon the ends to the other, and thus the pressure upon the ends of the piston will be equalized and the friction obviated.

16 represents abutments pivoted upon the frame 2 and extending into the cylinder through stuffing-boxes 18. These abutments are provided with ports 20 for the inlet and exhaust of the steam. I prefer to provide the lower extremity of the abutment with a packing-piece, 22, to make a steam-joint between it and the piston. This packing-piece is formed as shown in Fig. 1. The inner or lower surface conforms to the circumference of the piston against which it bears. The opposite side is made convex and fits into the corresponding concave end of the abutment. As the eccentric-piston revolves, the packing will oscillate in the concave end of the abutment, and will accommodate itself to the surface of the piston at all times, causing the whole lower surface to bear upon the piston. An oilway, 19, may be located in the abutment, for lubricating this portion of the machine.

24 is an equalizing-lever supported upon a rod or bar, 25, and located at some convenient point between the two abutments 16.

The bar 25 is preferably attached to the body of the cylinder, and passes through the equalizing-lever and through a washer, 26. The rod is preferably screw-threaded at its upper extremity, and may be provided with a nut bearing upon the washer to take up the wear and adjust the abutments. A spring or rubber washer, 27, may be inserted between the nut 29 and washer 26, to make a cushion. I prefer to construct the washer 26 with a rib, 30, upon its lower surface, which bears in a corresponding groove or recess in the equalizing-lever and allows the lever to oscillate over the rib as a fulcrum.

I prefer to provide the outer ends of the equalizing-lever with the ball-and-socket joints 32. I also prefer to place other ball-and-socket joints, 34, upon the abutments, or preferably upon the lever which connects the abutment with the pivot upon which it swings.

36 are connecting-rods which join the two ball-and-socket joints. It will be seen that one abutment is connected with one end of the equalizing-lever and the other abutment is connected with the opposite end of the said lever. Consequently as one rises the other must be depressed, and as the eccentric-pistons are oppositely placed upon the shaft one abutment will be raised and the other depressed in exactly equal ratio, so that by the introduction of the beam, fulcrumed equidistant between the two, as one abutment is raised the other will be forced down by the action of the equalizing-lever, and the end of the abutment always kept in the same relation with the pistons, and a steam-tight joint maintained between the abutment and the piston without the use of springs or similar devices.

The interior surfaces of the cylinder-heads are preferably recessed. A disk or plate, 40, is fitted within the recess and bears against the packing-rings upon the piston. The pressure between the plate and the packing-rings may be regulated by the set-screws 41 and 42. The set-screws 41 are tapped through the head and bear against the plate, and the set-screws 42 are tapped through the plate or disk and bear against the head, and by the use of both any required adjustment of the plate may be obtained and any wear on the rings may be compensated for.

I prefer to provide a means for adjusting the pistons in the cylinders at right angles to

the shaft and in the direction of the center or throw of the eccentric for the purpose of setting the piston out, so that the full side will bear against the interior of the cylinder with sufficient force to prevent leakage of steam, but not sufficient to create an undue amount of friction. To this end I construct a rectangular block, 44, through which the shaft is fitted and secured by splines 43. This block is inserted in a rectangular opening in the piston, which fits closely to the sides of the block; but the piston is allowed to slide upon the block for a certain distance in the direction of the full side of the said eccentric-piston. This movement is limited by inserting wedge-pieces 45 between the end of the block and the wall of the opening. By driving the wedges the piston is thrown out toward the wall of the cylinder and the wear taken up.

I claim as my invention—

1. In a rotary engine, the combination, with the oppositely placed eccentric pistons and the radially-sliding abutments provided with arms by which they are pivoted to the frame or bed-plate of the machine, of the equalizing-lever fulcrumed at a point equidistant between the said arms, and means for connecting the opposite ends of the said lever with the arms on the said abutment, substantially as described.

2. In a rotary engine, and in combination with the eccentric-pistons 8 and the radially-sliding abutments 16 of the equalizing-lever 24, attached to the said abutments, the fulcrum-bar 25, provided with the washer 26, and means for adjusting said washer upon said rod, substantially as described.

3. In a rotary engine, the combination, with the cylinder, of the eccentric-pistons, the packing-rings in the ends of the said pistons, and the recesses 14 within the inner circumference of the packing-ring, and the opening 15, connecting the recesses, in the manner and for the purpose substantially as described.

4. In a rotary engine, and in combination with the shaft 6 and the eccentric-piston 8, the rectangular block 44, held upon said shaft and upon which the said piston slides, and means for adjusting the said block in said recess, substantially as described.

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Witnesses:

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