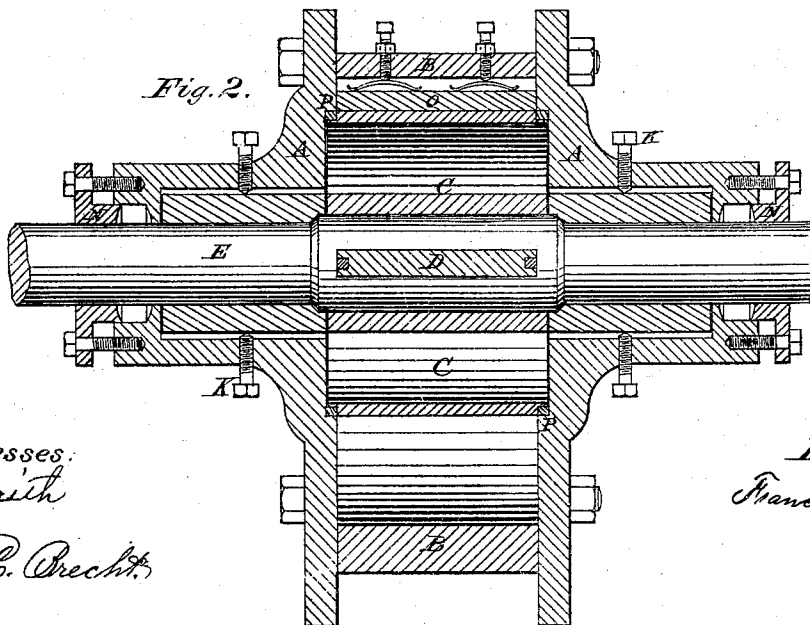
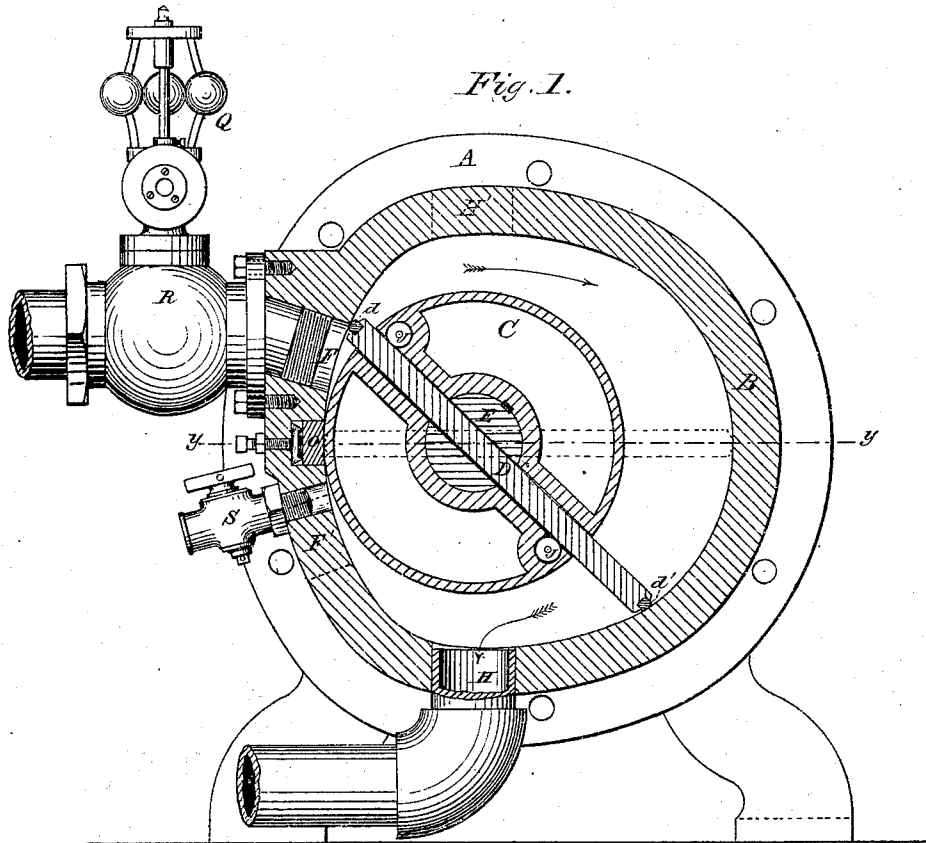


F. JESSOP.
Rotary-Engines.

2 Sheets--Sheet 1.

No. 133,318.

Patented Nov. 26, 1872.

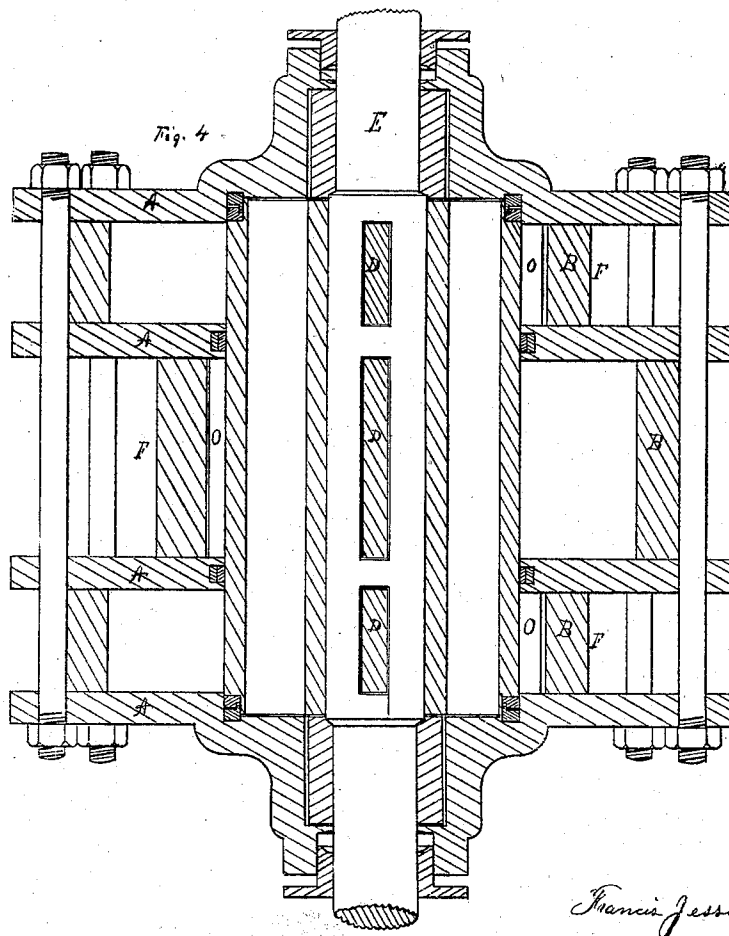
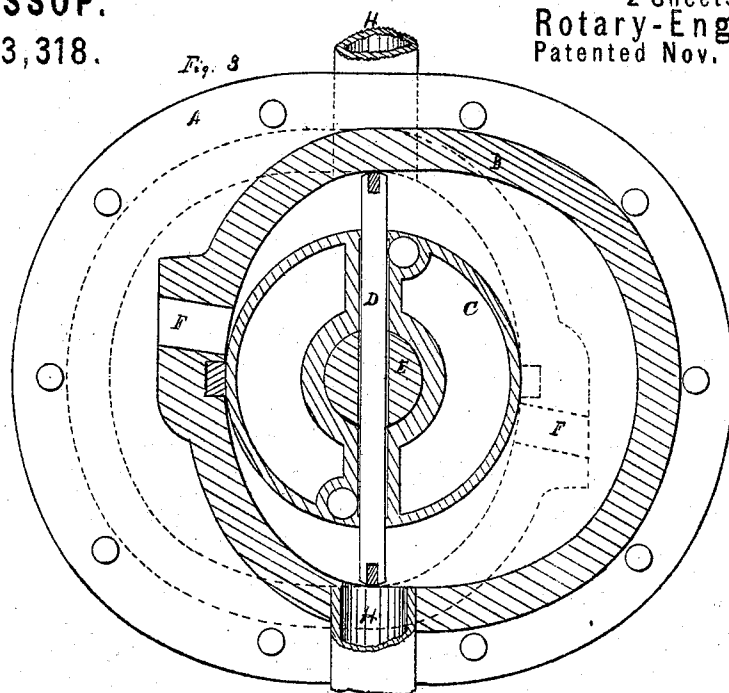


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F. JESSOP.
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Francis Jessop

UNITED STATES PATENT OFFICE.

FRANCIS JESSOP, OF YORK, PENNSYLVANIA.

IMPROVEMENT IN ROTARY ENGINES.

Specification forming part of Letters Patent No. 133,318, dated November 26, 1872.

To all whom it may concern:

Be it known that I, FRANCIS JESSOP, of York, county of York, State of Pennsylvania, have invented certain Improvements in Rotary Engines, of which the following is a specification:

This invention consists in the arrangement of the inlet and outlet ports of a rotary engine having an inner revolving cylinder or hub that is provided with a diametrical wing, and by which the shaft is rotated. It also consists in arranging the steam-chambers eccentrically upon the shaft and the diametrical wings in the same plane with each other, all of which will be more particularly described hereafter.

Description of Drawing.

Figure 1 is a vertical section of my machine. Fig. 2 is a horizontal transverse section, showing parts of machine below line *yy* in Fig. 2. Fig. 3 is a vertical section, and Fig. 4 a horizontal section, together showing the arrangement of three chambers, hubs, and wings upon the same shaft.

In the following general description steam is assumed to be the medium from which power is derived.

A A are eccentric disks, each having a boss on its outer side, which disks form the sides of the steam-chamber. *B* is the curb or curved part of case, the inner surface of which is turned in an eccentric or irregularly-curved form and held between the disks *A A* by bolts, as shown in accompanying drawing, Figs. 1 and 2. *C* is the hub, which is keyed or otherwise firmly attached to the shaft *E*. *D* is the sliding wing, fitted into a slot through the hub *C* and shaft *E*. This shaft and hub are placed eccentrically within the curb *B*, in order that the wing may have its principal projection for the steam to act upon on one side thereof, and to bring said hub in steam-tight connection with curb at the point *O*. The wing *D* has a reciprocating motion through the hub and shaft as they revolve together, which may be thus described: The end *d*, Fig. 2, when in the horizontal position shown by dotted lines, will be in the periphery of the hub *C*, and, as it rotates in the direction of the arrow, is protruded from said hub until it again assumes the horizontal position, when it has accomplished a half revolution, *d'*, being now protruded from the pe-

riphery of the hub *C* a distance equal to the difference between the length of the wing and the diameter of the hub. The lines described by the ends of wing *d* and *d'* in this semi-revolution give the interior form of the curb *B*, which may be thus drawn or geometrically laid down. *J J* are friction-rollers, to be used or not, as desired, to facilitate the reciprocating motion of slide *D*. The bosses on disks *A A* contain the bearings for the shaft *E* to run in, which bearings may rest upon set-screws *K* for convenience in centering the shaft and hub and taking up the wear. Upon the end of said bosses are the stuffing-boxes and glands *N*, to prevent escape of steam. The ends of shaft *E* are prolonged to carry a driving-pulley on either or both ends, from which power is to be transmitted to the line-shaft and machinery, and, if desired, a balance-wheel also. Additional bearings to assist in carrying the weight of pulley and strain of belt may be placed outside the pulley, or the shaft *E* may be coupled directly to the line-shaft, thereby dispensing with belt or other means of transmitting motion of engine to shaft. *F* is the inlet steam passage connecting with the boiler, and is placed as near to *O* as practicable, to freely admit steam. *H* is the exhaust or outlet passage, which, to obtain the best results, should be placed at or near a point where the opposite ends of wing *D* are equally projected from the hub *C*. At *F'* and *H'*, Fig. 1, may be additional inlet and outlet passages, placed the same, relatively to each other, as those above described, but on opposite sides of the point *O* from *F* and *H*, their use being to cause rotation of the hub and shaft in a direction the reverse to that indicated by the arrow in Fig. 1, as is requisite for marine and locomotive engines, and other purposes where it is necessary to reverse the direction of motion at will. *O* is a block or piece of metal fitted into a groove or recess running across the curb parallel to the direction of the shaft *E*, its purpose being to keep a steam-tight joint between the curb *B* and hub *C*, and is kept up to its place by springs and set-screws or other suitable arrangement. The ends and sides of wing *D* may be grooved and suitable packing put in, kept in place by springs, steam pressure, or otherwise, to secure a steam-tight joint between the said wing and the surrounding case. *P P* are pack-

ing-rings placed upon the ends of the hub C to prevent steam passing through between the hub and side plates. Q is a governor, receiving motion from shaft E by means of a belt. R is the governor-valve, to which attachment is made in the usual manner. S is a waste-cock, for the escape of water or other fluid that may be carried past the outlet H, or a groove or channel may be cut in the curb from O to H to accomplish the same result. In order to avoid the friction caused by the inward pressure upon the hub C, one or more additional chambers, A, with parts as described, may be placed upon the same shaft E, the points of greatest eccentricity of the curbs B B being diametrically opposite, and if three of these chambers are used, which makes the best arrangement, the two outer ones will be arranged as above with respect to the middle one, and will each have a breadth of face equal to one-half that of the middle one. The steam is exhausted simultaneously from all three cylinders. Thus the inward pressure in the wide chamber is counterpoised by that in the two smaller ones; and the friction and wear on journals are avoided.

The operation is as follows: Steam or other elastic fluid being admitted by opening the throttle-valve in inlet-passage F, it flows into the chamber surrounding the hub C, there being no escape in the direction of O, and, bearing against the projecting end of the wing D, will cause the wing to move forward, as indicated by the arrow in Fig. 1, with increasing force, as the wing is protruded further by the action of its opposite end *d'* upon the eccentric curve of curb B, converging toward O. When by its revolution the end *d'* is brought forward so as to break or cut off the connection between the passage F and the space contained between the ends *d* and *d'* of the wing, the elastic fluid contained therein will urge forward by its expansive force the end *d* of the wing, so long as the projection of said end *d* is greater than the projection of the end *d'*. When these projections are equalized by the position of the wing with reference to the curb, the contained fluid should be permitted to escape through the exhaust-passage H; and thus continually will first the positive force of the steam, air, or other elastic fluid aforesaid, urge forward the alternate ends of the wing, and then the expansive force still acts with advantage till it is dis-

charged at H. When desired for use as a low-pressure condensing-engine, the condenser is attached in the usual manner. When used as a marine, locomotive, or other reversible engine, the operation is the same in either direction, as described. By appropriate lever and link attachments, the medium of power used is thrown, at the will of the attendant, into either side of the chamber, as readily and with like results to that of reversible steam-engines in common use. As a hydraulic engine, the operation is similar to that described for steam, &c., but the inlet and outlet passages being much larger proportionately, and so arranged relatively as to make no allowance for expansion.

The operation for pumping water, or other fluid or semi-fluid substance, is as follows: Motion being given to the shaft E, causing the hub and wing to rotate in a direction the opposite to that indicated by arrow, operates to produce a vacuum in the chamber and passage H, in effect similar to the raising of the plunger in a plunger-pump, thereby lifting and drawing into the said chamber water, air, or other fluid with which the passage H communicates. That quantity lifted and drawn in by one end of the wing is driven or forced out of the passage on the opposite side of hub C by the other end of said wing, and it thus, while kept in motion, continues to draw up and throw out a stream of water, air, or other substance acted upon.

I claim as my invention—

1. The combination of curb B with the wing D and the hub C on the shaft E, constructed and arranged substantially as set forth.

2. The relative arrangement of the inlet and outlet ports F and H in the curb B to the wing D and hub C, all constructed and operating substantially as and for the purpose set forth.

3. The arrangement of two or more steam-chambers, B, placed eccentrically upon the same shaft E having diametrical wings D in the hub C, placed in the same plane with each other, by which a counterpoise is obtained, and all constructed and arranged substantially as and for the purpose set forth.

FRANCIS JESSOP.

Witnesses:

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