(No Model.)

H. OBERMEYER.

RECIPROCATING ROTARY ENGINE.

No. 600,886. Patented Mar. 22, 1898.

Fig. 1.

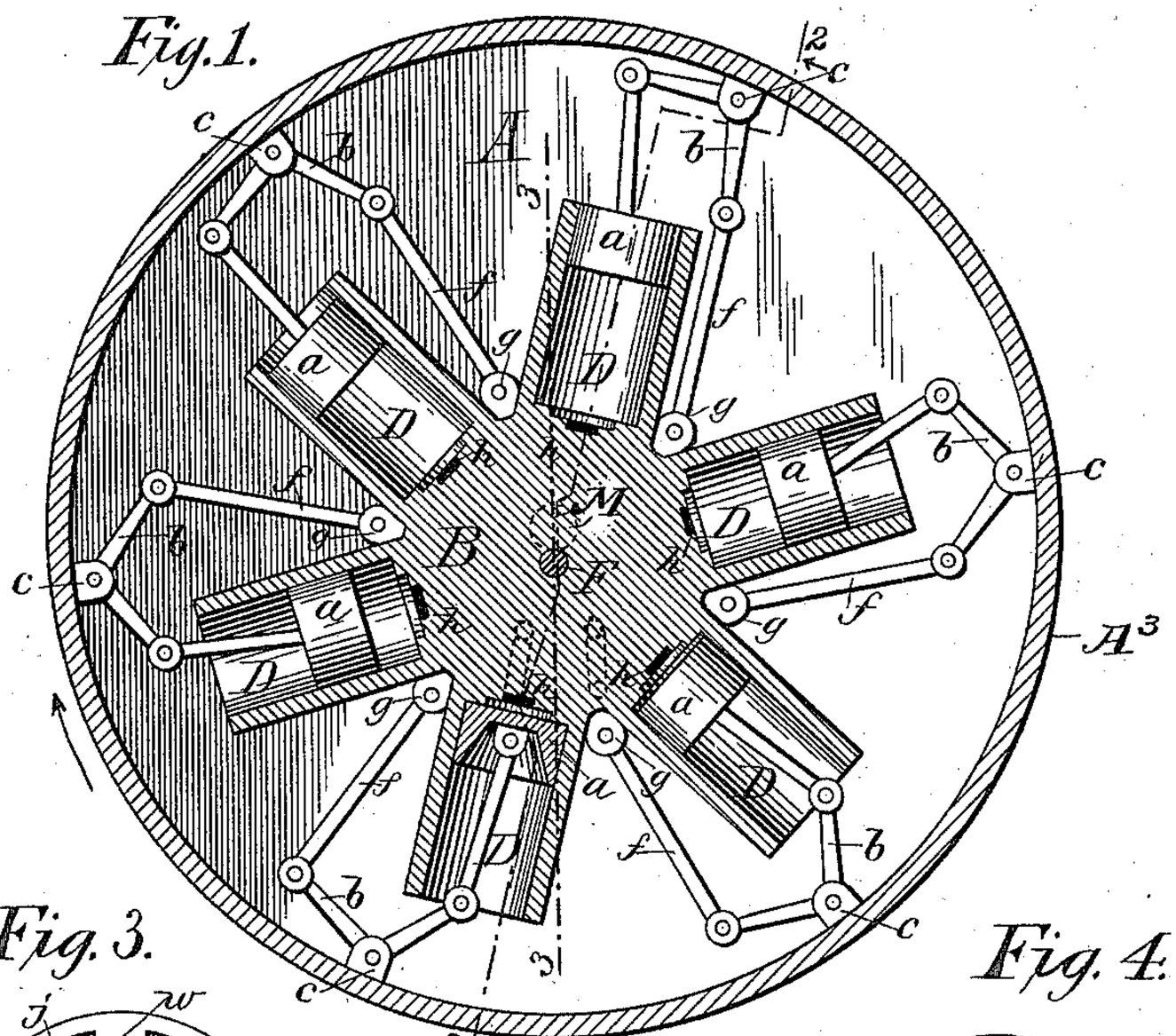

Fig. 3.

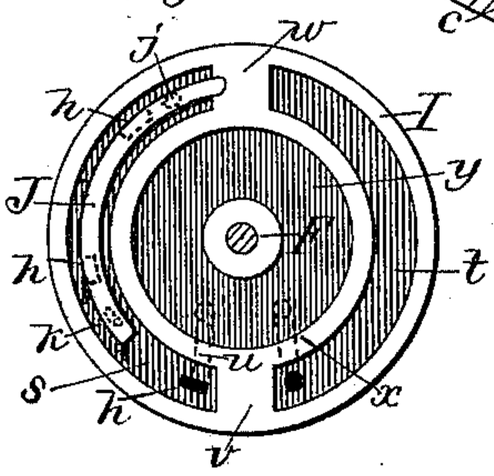

Fig. 4.

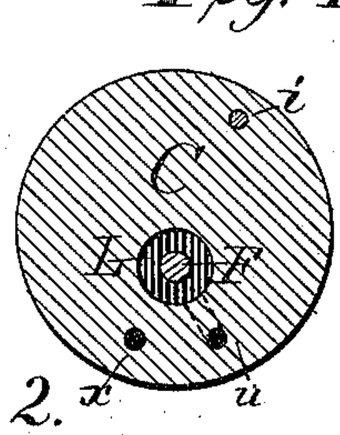

Fig. 2.

Fig. 5.

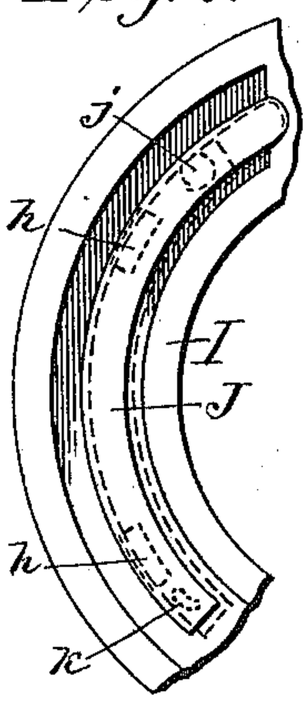

Fig. 6.

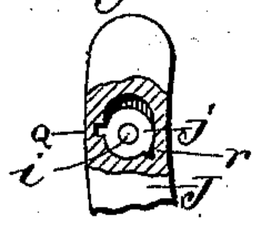

Fig. 7. Fig. 8.

Witnesses:

W. P. Gentleman

M. H. Barringer.

Inventor:

Henry Obermeyer.

UNITED STATES PATENT OFFICE.

HENRY OBERMEYER, OF BEATRICE, NEBRASKA.

RECIPROCATING ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 600,886, dated March 22, 1898.

Application filed March 22, 1897. Serial No. 628,799. (No model.)

To all whom it may concern:

Be it known that I, HENRY OBERMEYER, a citizen of the United States, residing at Beatrice, in the county of Gage and State of Nebraska, have invented certain new and useful Improvements in Reciprocating Rotary Engines, of which the following is a specification.

My invention relates to improvements in reciprocating rotary engines; and it consists in novel structural features and novel combinations of parts, the operations of which parts separately and in combination are hereinafter described, and the novel combinations of which parts are specified in the claims hereto appended.

Referring to the accompanying drawings, forming a part of this specification, Figure 1 is a sectional elevation of the engine; Fig. 2, a sectional elevation in the line 2 2 in Fig. 1; Fig. 3, a detail in elevation of the valve-seat and cut-off; Fig. 4, a sectional elevation of the bearing C in line 4 4 in Fig. 2; Fig. 5, an enlarged elevation of the cut-off and part of valve-seat; Fig. 6, an enlarged elevation of the upper end of cut-off, broken away to show the cam *j;* Fig. 7, an enlarged elevation of the lower end of cut-off, broken away to show the pin *k;* and Fig. 8, an enlarged sectional elevation of the cam *j* and part of the cut-off.

In the drawings similar characters of reference indicate corresponding parts in all the figures.

The rotatable hollow wheel or cylinder A comprises heads A′ and A^2 and a peripheral rim A^3 and is mounted to rotate on a shaft M, which is fixed to the head A′, and on a bearing or head C, which is keyed or otherwise fixed to and supported by one of the standards K, the other of which standards supports the shaft M. The head A′ is preferably removable and may be fixed to the rim A^3 by bolts or otherwise, and ball-bearings are preferably interposed between the head A^2 and the bearing C.

The actuating mechanism of the wheel A consists of one or more ordinary steam-cylinders D, projecting radially from and preferably forming an integral part of the hub B, which rotates on the shaft F. (See Fig. 1.) Each cylinder acts independently of the other and is provided with a piston *a*, the rod of which connects with a bell-crank *b*, which bell-crank is pivotally connected at its bend by a pivot-bolt *c* with lugs projecting inwardly from the rim A^3, the other arm of said bell-crank being pivotally connected with one end of a link *f*, the other end of which is pivotally connected with the hub B. The common center upon which the wheel A revolves being at the axis of the shaft M, the center F, upon which the hub B, supporting the cylinders D, revolves, is eccentric to the common center M. Therefore the rim of the wheel A bears the same relation to the center F as the crank-pin to the shaft of an ordinary reciprocating engine. As shown in Fig. 1 by the dotted line 3 3, the centers M and F are in line to each other, and the lower cylinder D, being at the left hand or forward of this line and opposite the steam-inlet port *h*, is in the same relative position as an ordinary engine just past its center and opposite the steam-port *h* and has the same amount of leverage when the steam or other motive agent is admitted.

As shown in Fig. 1, the crank *b*, to which the piston-rod is attached, is pivoted to the wheel A at *c*, a point which throws the piston-rod at an angle forward of the axis of the cylinder, giving additional leverage on the crank and tending to force forwardly as well as outwardly. It is evident from the connection of parts that the outward movement of the end of the bell-crank connected with the piston-rod cannot be accomplished without exerting a force circumferential of and tending to rotate the wheel A forwardly in the direction indicated by the arrow at Fig. 1. In addition to the leverage already described the opposite arm of bell-crank *b* acts in conjunction with the link-rod *f* against the hub B, thereby exerting further circumferential and forwardly-acting propelling force against the wheel A. The direct force thus applied through one arm of the bell-crank and the reactionary force applied through its other arm both act on the wheel A at the pivot-point *c* circumferentially and forwardly in a direction indicated by the arrow at Fig. 1.

The wheel A may be constructed as a cylinder having opposite heads and made air-tight, so that the contained air will be carried around therewith and not resist the revolution of the cylinders D and other working parts or may be constructed with open or

spoke-shaped heads. Access to the interior may be had by removing the movable head or by means of hand-holes *m m*. The check-valve *n* is a means of escape for any accumulation of steam through leakage. The transmitting of power may be accomplished by attaching the engine directly to the shaft of the machine to be driven, or by belting from pulley N, or by using the wheel A as a pulley.

One side of wheel or hub B, as shown in Fig. 2, forms the valve and rests against its seat I and is provided with as many steam-inlet ports *h* as there are cylinders D. As the wheel or hub B revolves, each cylinder as its respective port *h* passes the point *v* on valve-seat, Fig. 3, takes steam or other motive agent from the adjacent inlet-conduit *u*. (Shown by dotted lines on valve-seat I in Figs. 2 and 3.) As the wheel is forced forward each port as it passes the point *w* on valve-seat, Fig. 3, will exhaust through the chamber *t*, conduits *x x*, and pipe O. The conduit *x*, which passes through the bearing C, Fig. 2, being in a position horizontal to conduit *u*, is shown more plainly in Fig. 4. The exhaust-pipe O is shown by dotted lines projected from pipe H.

The valve-seat I is secured to the bearing C with the shaft F as its center and is provided with an annular chamber *y*, the object of which is to diminish the friction with the valve B. (See Fig. 3.) The position of the cylinders D (shown in Fig. 1) locates three ports *h* opposite the chamber *s*. The position of two is shown by dotted lines, the other being opposite the inlet-conduit *u*. (See Fig. 3.) For the purpose of regulating the volume of steam that at once fills the chamber *s* on opening the throttle and securing the full expansion of same a cut-off J is provided, which closes two of the three adjacent ports *h*. The cut-off is held in position by the cam *j* and pin *k* and has a slight longitudinal and lateral movement. When the engine is at work, the cut-off is in position shown in full lines; when at rest or taking more steam, as shown by dotted lines. (See Fig. 5.) The action of the cut-off is controlled by any ordinary governor (not shown) attached to the shaft *i*, passing through the bearing C and connecting with cam *j*. (More plainly shown in Figs. 2 and 8.) Any decrease in speed is counteracted by the governor acting on the cam-shaft *i*, rotating the cam *j*, so as to engage with the cut-off at Q and force it downward, (see Fig. 6,) and as the lower end is guided by the pin *k* in arc slot *l* (see Fig. 7) it will be given a lateral movement also, as shown by dotted lines in Fig. 5, and admit steam to the lower port. If this additional force does not counteract the decrease in motion, the cam will continue to rotate and engage with the cut-off at *r*, giving the same a lateral movement at the top and admitting steam to the upper port. When the momentum has been regained, the action of the cam is vice versa, closing first the upper port and afterward the lower, if the energy be too strong. A reversible motion may be obtained by placing a cut-off J in chamber *t* and connecting the cylinder L with the conduit *x*, same as L and *u*, and placing a check-valve in cylinder over each port.

The bearing C acts as a support for the valve-seat I, shaft F, governor-rod *i*, and as a means of admitting steam to and from the wheel B. The object of the chamber L and piston G is to counteract the pressure in chamber *s* against the valve B. The piston-head G is adjustable lengthwise of and on the shaft or piston-rod F by screwing it thereonto or otherwise, so that the capacity of chamber L will exceed that of chamber *s* sufficiently to counterbalance the pressure on the valve and cause a pressure against valve-seat to make union steam-tight. The cylinder L receives a continuous pressure from the inlet-port *u'* connecting with conduit *u*. The check-valve in head of cylinder is to relieve it of any back pressure.

Although I have specifically described the construction and relative arrangement of the several elements of my improved engine, yet I do not desire to be confined to the same, as such changes or modifications may be made as fairly fall within the scope of my invention, as hereinbefore described, and as expressed in the combinations forming the subject-matter of the claims which follow.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In a reciprocating rotary engine, and in combination substantially as described, a rotary drum or wheel, one or more steam-cylinders fixed to and projecting radially from a hub with an axis of rotation eccentric to the axis of rotation of said drum or wheel and each of said cylinders provided with a piston and piston-rod, bell-crank levers each medially pivoted to said drum or wheel, and each pivotally connected at one of its ends with one of said piston-rods, and rods pivotally connecting the other ends of said bell-cranks with said hub, whereby a long crank leverage is obtained with a short stroke of the piston.

2. In a reciprocating rotary engine, and in combination, substantially as described, a rotary drum or wheel, one or more steam-cylinders fixed to and projecting from a hub with an axis of rotation eccentric to the axis of rotation of said drum or wheel and each of said cylinders provided with a piston and piston-rod, bell-crank levers each medially pivoted to said drum or wheel and each pivotally connected at one of its ends with one of said piston-rods, rods pivotally connecting the other ends of the bell-cranks with said hub, one end of which hub forms a valve, a steam-inlet port in said hub for each steam-cylinder, and a valve-seat having steam chambers and conduits.

3. In a reciprocating rotary engine, and in combination, substantially as described, a ro-

tary drum or wheel, one or more steam-cylinders fixed to and projecting from a hub with an axis of rotation eccentric to the axis of rotation of said drum or wheel, and each of said cylinders provided with a piston and piston-rod, bell-crank levers each medially pivoted to said drum or wheel and each pivotally connected at one of its ends with one of said piston-rods, rods pivotally connecting the other ends of the bell-cranks with said hub, one end of which hub forms a valve, a valve-seat having steam chambers and conduits, a steam-conduit in one of the fixed bearings on which the drum or wheel rotates, a seat for the rod *i* in same bearing, a cut-off, and a chamber for the piston which regulates the pressure of the valve on the valve-seat.

4. In a reciprocating rotary engine, and in combination, substantially as described, a rotary drum or wheel, one or more steam-cylinders fixed to and projecting from a hub with an axis of rotation eccentric to the axis of rotation of said drum or wheel and each of said cylinders provided with a piston and piston-rod, bell-crank levers each medially pivoted to said drum or wheel and each pivotally connected at one of its ends with one of said piston-rods, rods pivotally connecting the other ends of the bell-cranks with said hub, one end of which hub forms a valve, a valve-seat having steam chambers and conduits, a steam-conduit in one of the fixed bearings on which said drum or wheel rotates, a steam-chamber in said bearing, a steam-conduit communicating therewith, a shaft extending through said bearing, said hub and said valve and into said steam-chamber, and a piston adjustably seated on said shaft in said steam-chamber whereby said valve is held to its seat.

HENRY OBERMEYER.

Witnesses:
W. P. GENTLEMAN,
M. H. BARRINGER.