

No. 726,684.

PATENTED APR. 28, 1903.

H. M. HJERMSTAD & E. O. SOHN.

ROTARY ENGINE.

APPLICATION FILED JULY 14, 1902.

NO MODEL.

3 SHEETS—SHEET 1.

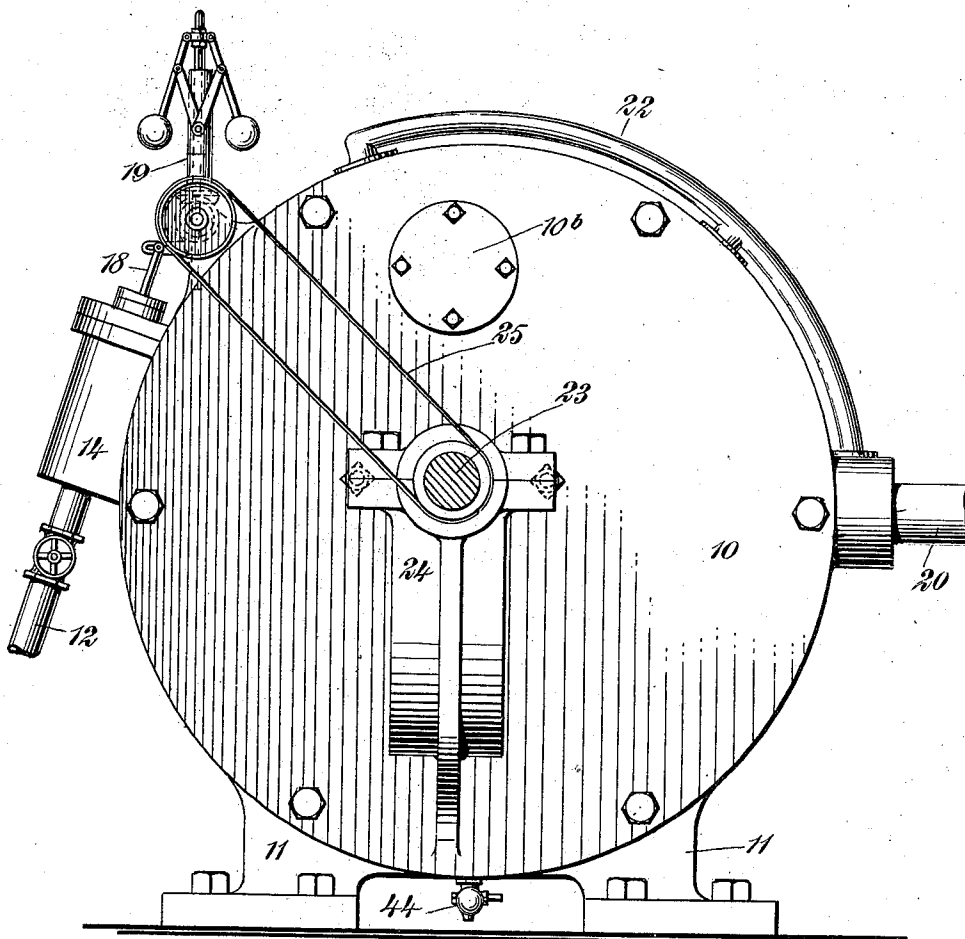


Fig. 1

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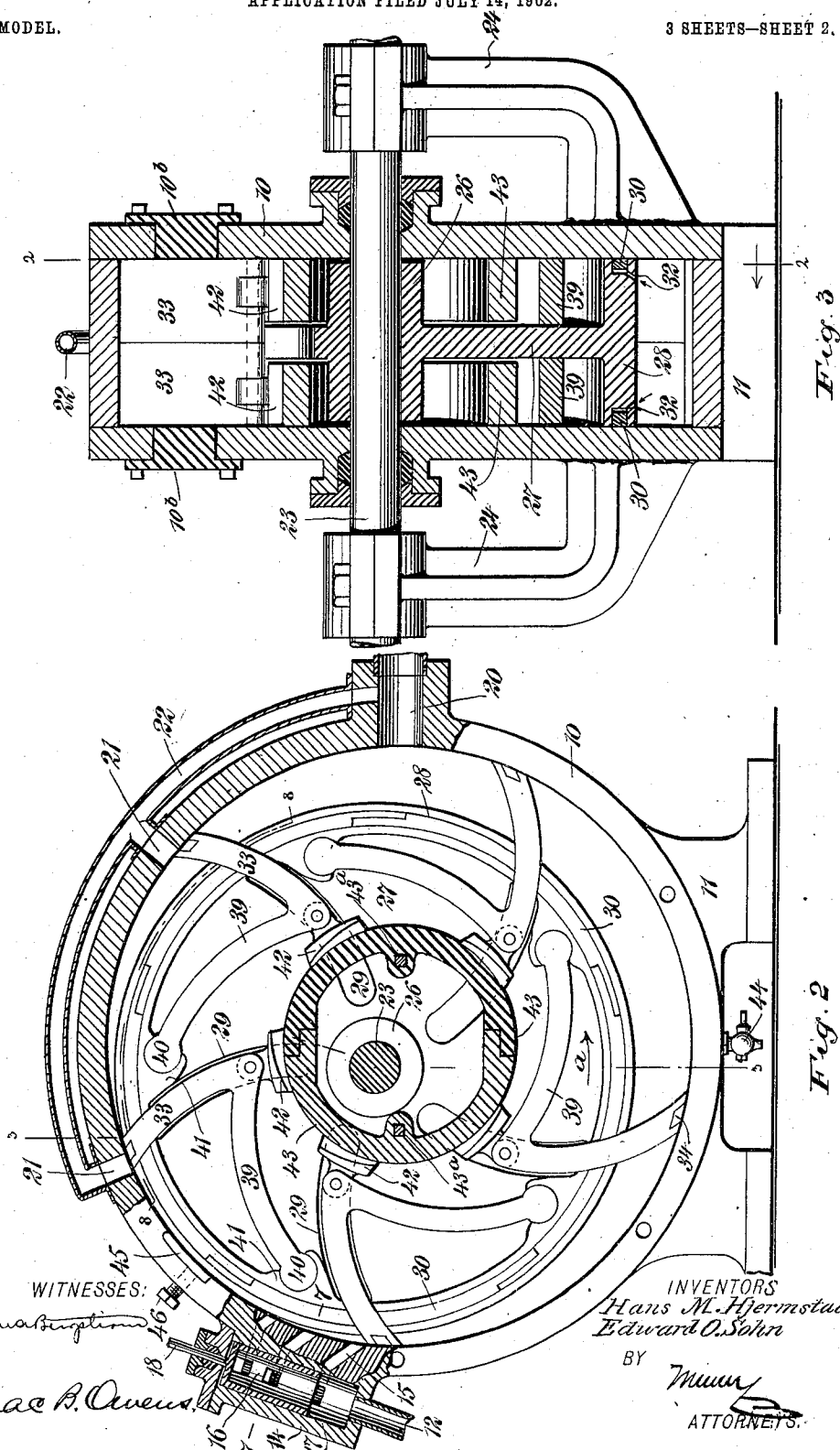
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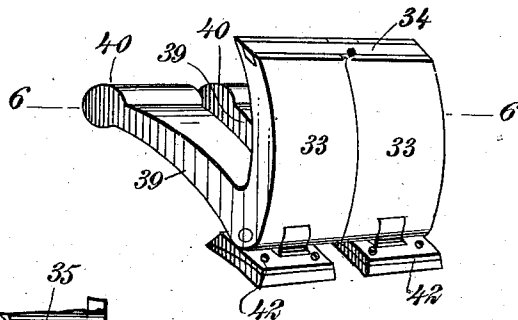


Fig. 4

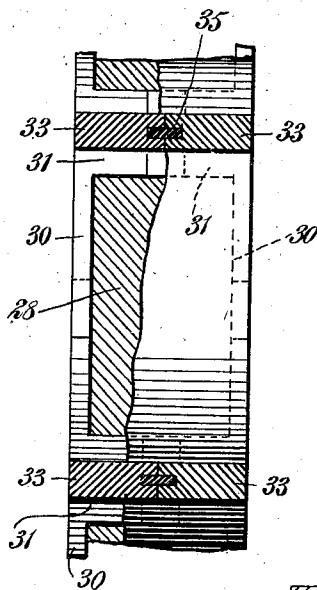


Fig. 8

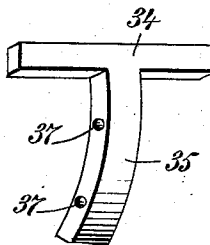


Fig. 5

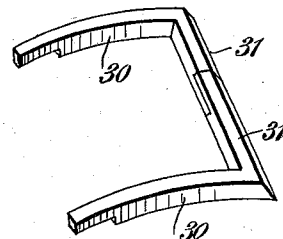


Fig. 9

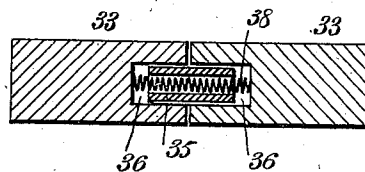


Fig. 6

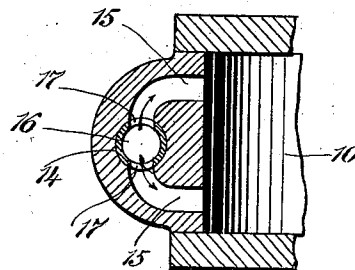


Fig. 7

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UNITED STATES PATENT OFFICE.

HANS M. HJERMSTAD AND EDWARD O. SOHN, OF HADER, MINNESOTA.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 726,684, dated April 28, 1903.

Application filed July 14, 1902. Serial No. 115,467. (No model.)

To all whom it may concern:

Be it known that we, HANS M. HJERMSTAD and EDWARD O. SOHN, citizens of the United States, and residents of Hader, in the county of Goodhue and State of Minnesota, have invented a new and Improved Rotary Engine, of which the following is a full, clear, and exact description.

This invention relates to a rotary engine having an eccentrically-mounted piston carrying wings or piston-heads which run on a concentric guide and are thereby caused to move in and out relatively to the piston as the piston turns. The steam is passed through the cylinder or casing in a continuous stream, thereby to act by impact on the wings or piston-heads and impart a continuous rotary movement to the piston and its shaft.

The apparatus involves features of structure and coactive arrangement, all of which will be fully described hereinafter.

This specification is an exact description of one form of our invention, while the claims define the actual scope thereof.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a side elevation of the invention. Fig. 2 is a section on the line 2 2 of Fig. 3. Fig. 3 is a section on the line 3 3 of Fig. 2. Fig. 4 is a detail perspective view of a wing or piston-head. Fig. 5 is a detail perspective view of the packing for the wing. Fig. 6 is a section on the line 6 6 of Fig. 4. Fig. 7 is a section on the line 7 7 of Fig. 2. Fig. 8 is a plan view and partial section of the piston on the line 8 8 of Fig. 2, and Fig. 9 is a detail perspective view of the packing for the piston.

10 indicates a circular casing or cylinder, which is mounted on a suitable base 11.

10^b indicates a manhole and cover for the usual purpose.

12 indicates the steam-supply pipe, which leads to a chest 14, and this chest communicates by ports 15 with the interior of the cylinder 10. These ports 15 are arranged in pairs, as shown best in Fig. 7. Within the chest 14 is a cylindrical valve 16, having ports 17 therein, arranged, respectively, to register with the ports 15 and gradually to close or

open the steam-supply. This valve 16 is connected by its stem 18 with a governor 19 of any suitable form, and under the action of the governor the said valve 16 is shifted in the case 14, so as to enlarge or diminish the size of the steam-inlet orifices. By this means the speed of the engine may be regulated automatically by the action of the governor.

20 indicates the exhaust-passage, which is located on the side of the cylinder, approximately opposite the inlet-ports 15. Formed in the upper part of the cylinder between the inlet and exhaust ports are a number (preferably two) of relief-passages 21, which are intended to carry off any vapor that might be carried around with the piston past the exhaust-port. These relief-ports 21 communicate with a pipe 22, which passes down to and leads into the exhaust-passage, as shown best in Fig. 2.

23 indicates the engine-shaft, which is mounted in brackets 24, carried on the cylinder, or by any other means desired. This shaft 23 passes eccentrically through the cylinder and is connected by a gear 25 with the governor. (See Fig. 1.) Fastened to the shaft 23 within the cylinder is a piston-hub 26, which carries the web 27, and on this web in turn is carried the rim 28, these parts 26, 27, and 28 making up the piston of the engine. The web 27 is formed with arc-shaped slots 29, which pass from adjacent to the hub 26 outward to the periphery of the piston and extend through the rim 28, forming transverse slots across the face thereof. The rim 28 is packed against the interior side walls of the cylinder by means of packing-strips 30, (see Figs. 2 and 3,) these packing-strips lying in grooves formed in the edges of the rim, as shown. The packing-strips 30 have extensions 31 at their ends, (see Fig. 9,) which extensions are fitted, respectively, in grooves formed in the transverse edges of the rim 28, which edges constitute the walls of the transverse slots in said rim. In order to force the packing-strips 30 and 31 outward into active position, steam-orifices 32 are formed in the rim 28, (see Fig. 3,) thus admitting the steam back of the packing-strips and forcing said strips outward.

The wings or piston-heads are formed of two sections 33, which lie snugly side by side to

form a continuous surface and which are curved in an arc corresponding to the arc of the slots 29, these wings lying in said slots, so as to move in and out thereof, as illustrated in Fig. 2. The wings are of a width equal exactly to the interior width of the cylinder and pass through the before-mentioned transverse slots 29 in the rim 28 of the piston, at which points the wings are packed by the extensions 31 of the packing-strips 30.

34 indicates a packing-strip which is placed in the outer ends of the wings, this strip extending from one section 33 to the other and having a stem 35, which fits after the manner of a key or gib into cavities 36, formed in the inner or adjacent edges of the sections 33. (See Fig. 6.) These stems 35 have transverse passages 37 therein, (see Fig. 5,) and in these passages expansive springs 38 are placed to bear at their respective ends against the sections 33 of the wings, thus tending to spread said sections against the inner side walls of the cylinder. Attached to or formed integrally with each section 33 of each wing is an arm or shank 39, these arms terminating in rounding ends 40, which are mounted to rock in sockets 41, formed on the inner periphery of the rim 28 at each side of the web 27. By these means the wings are mounted to swing through the slots 29 inward to the position shown at the upper left-hand side in Fig. 2 and outward to the position shown at the right-hand side of Fig. 2. Each section of each wing carries pivotally a shoe 42, and these shoes are formed each of two wedge-shaped sections, by the adjustment of which the thickness of the shoes may be increased or diminished at will. The shoes 42 run on the outer peripheries of the two annular guides 43, which guides are carried fast by the respective side walls of the cylinder 10 and are disposed concentrically to said cylinder, and therefore eccentrically to the shaft 23. The guides 43 are formed, preferably, in two sections, (see Fig. 2,) which sections have overlapped ends and are fastened to the cylinder by bolts 43^a or the like. The revolution of the piston, carrying with it the parts 33 and 42, will cause the shoes to turn around the guides, and therefore the in-and-out movement of the wings relative to the piston will be brought about.

In the operation of the apparatus the steam-pressure is admitted into the chest 14 and from thence by the ports 15 into the cylinder. These ports are inclined downward, thus directing the steam in the direction of the arrow *a* in Fig. 2, the steam acting on the wings and causing the piston to turn in the same direction. The steam passes around the lower side of the piston into the gradually-enlarging space provided by the eccentric position of the piston and acts continuously on the wings, this action keeping up until the exhaust-port 20 is reached, whereupon the steam passes to the atmosphere. Such portions of the steam as may be carried beyond

the exhaust-port are exhausted through the relief-ports 21 and return by the pipe 22 to the exhaust-pipe, as shown. This imparts a continuous rotary movement to the piston. As the wings pass the exhaust-port the position of the guides 43 and the action of the interior walls of the cylinder causes the wings to move back into the piston until at a point immediately before reaching the inlet-ports 15 the wings lie wholly inward of the periphery of the piston.

A petcock 44 may be provided at the bottom of the cylinder to facilitate drawing off the water of condensation which may accumulate therein.

45 indicates a packing-strip which is placed in the seat of the cylinder at the point thereon at which the periphery or rim 28 of the piston engages, and 46 indicates a set-screw or other means for adjusting this packing-rim.

Various changes in the form and details of our invention may be resorted to at will without departing from the spirit of our invention. Hence we consider ourselves entitled to all forms of the invention as may lie within the intent of our claims.

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

1. The combination of a cylinder, an eccentric piston mounted to turn therein and provided with an opening in its periphery, an angular wing carried by the piston to move in and out through the opening therein, a shoe pivotally mounted on the wing at the junction of the members of the wing, and a guide carried by the cylinder eccentric to the piston and engaged by the shoe, for the purpose specified.

2. The combination of a cylinder, an eccentric piston mounted to turn therein and provided with an opening in its periphery, a wing, an arm attached to the wing and mounted to swing on the piston, whereby to mount the wing to move in and out through the opening in the piston, a shoe pivotally mounted on the wing, and a guide carried by the cylinder eccentric to the piston and engaged by the shoe.

3. The combination of a cylinder, an eccentric piston mounted to turn therein and provided with a plurality of openings leading out through its periphery, a plurality of wings pivotally mounted on the piston to move in and out through the openings therein, said wings continually engaging the inner periphery of the cylinder, and a guide carried by the cylinder eccentric to the piston and engaged by the wings, for the purpose specified.

4. The combination of a cylinder, an eccentric piston mounted to turn in the cylinder, said piston comprising a web and a rim, and provided with an arc-shaped slot in the web and a slot in the rim registering with the slot in the web, an angular wing mounted to swing and having one member working in the

said slots, a shoe pivoted to the wing at the junction of the members of the wing, and a guide carried by the cylinder, as set forth.

5 The combination of a cylinder, an eccentric piston mounted to turn therein, said piston comprising a web and a rim, and being formed with a slot extending through the web outward through the rim, a wing fitted in said slot to move in and out with respect to the piston, an arm on each side of the web of the piston, said arms being mounted to swing and having connection with the wing to move therewith, a guide carried by the cylinder, for the purpose specified, and a shoe pivotally mounted on the wing and engaging said guide.

15 6. The combination of a cylinder, an eccentric piston mounted to turn therein, said piston comprising a web and a rim, and being formed with a slot extending through the web outward through the rim, a wing fitted in said slot to move in and out with respect to the piston, an arm on each side of the web of the piston, said arms being mounted to swing and having connection with the wing to move therewith, a guide carried by the cylinder, for the purpose specified, said guide being formed in two parts lying one at each side of the web, and two shoes pivotally connected to the wing and bearing respectively on said parts of the guide.

30 7. The combination of a cylinder, an eccentric piston mounted to turn therein, said piston comprising a web and a rim, and being formed with a slot extending through the web outward through the rim, a wing fitted in said slot to move in and out with respect to the piston, an arm on each side of the web of the piston, said arms being mounted to swing and having connection with the wing to move therewith, a guide carried by the cylinder, for the purpose specified, the said wing being formed in two sections, a packing-strip extending along the outer edges of the sections of the wing, said packing-strip having an extension projecting between the meeting edges of the said sections of the wing, and a spring projecting through said extension of the pack-

ing-strip and bearing against the sections of the wing.

8. In a rotary engine, the combination of a cylinder, a piston eccentrically mounted therein and provided with openings in its periphery, wings pivoted to the piston to swing out through the openings therein, each wing comprising two sections arranged side by side and each yieldingly held in engagement with a side wall of the cylinder, and means for moving the said wings out through the openings of the piston, as set forth.

9. In a rotary engine, the combination of a cylinder, a piston eccentrically mounted in the cylinder and provided with openings in its periphery, wings pivoted to the piston to swing out through the openings therein, each wing comprising two sections arranged side by side, and having a spring arranged between them to force them apart, and means for moving the wings out through the openings of the piston, as set forth.

10. In a rotary engine, a piston comprising two spring-pressed sections arranged side by side and having their ends and adjacent edges recessed, and a packing-strip arranged in the recess of the ends of the sections and provided with a stem extending into the recesses of the adjacent sides of the said sections, as set forth.

11. In a rotary engine, a piston-wing comprising two sections arranged side by side and having their ends and adjacent edges recessed, a packing-strip arranged in the recesses of the ends of the sections and provided with an apertured stem extending into the recesses of the adjacent sides of the sections, and a spring arranged in the aperture of the said stem and having its ends bearing against the sections, as set forth.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

HANS M. HJERMSTAD.
EDWARD O. SOHN.

Witnesses:

Mrs. S. S. HOMMEDAL,
Mrs. ANNA GJEMSE.