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Patented Dec. 11, 1900.

C. H. ASLING & A. HELMS.

ROTARY ENGINE.

(Application filed Apr. 7, 1900.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1.

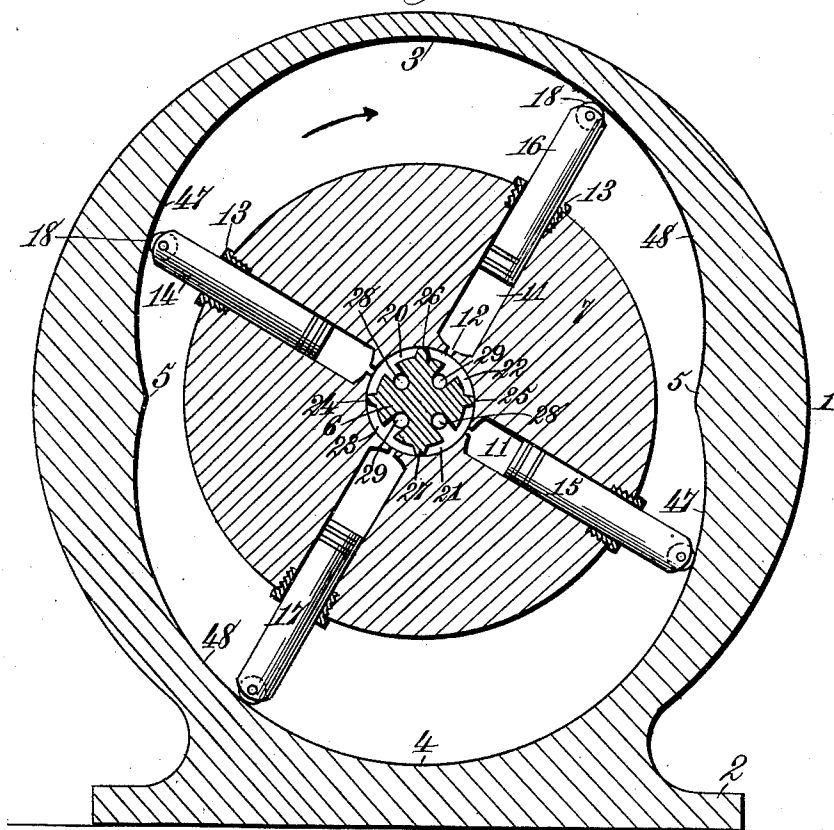
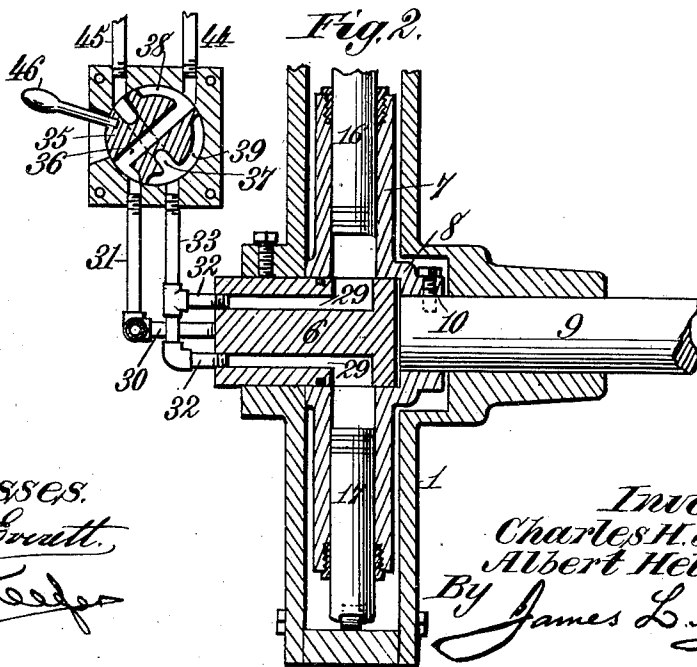


Fig. 2.



Witnesses.
Robert G. Pratt.
J. B. Keeler

Inventors.
Charles H. Asling.
Albert Helms.
By James L. Norris
Atty.

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2 Sheets—Sheet 2.

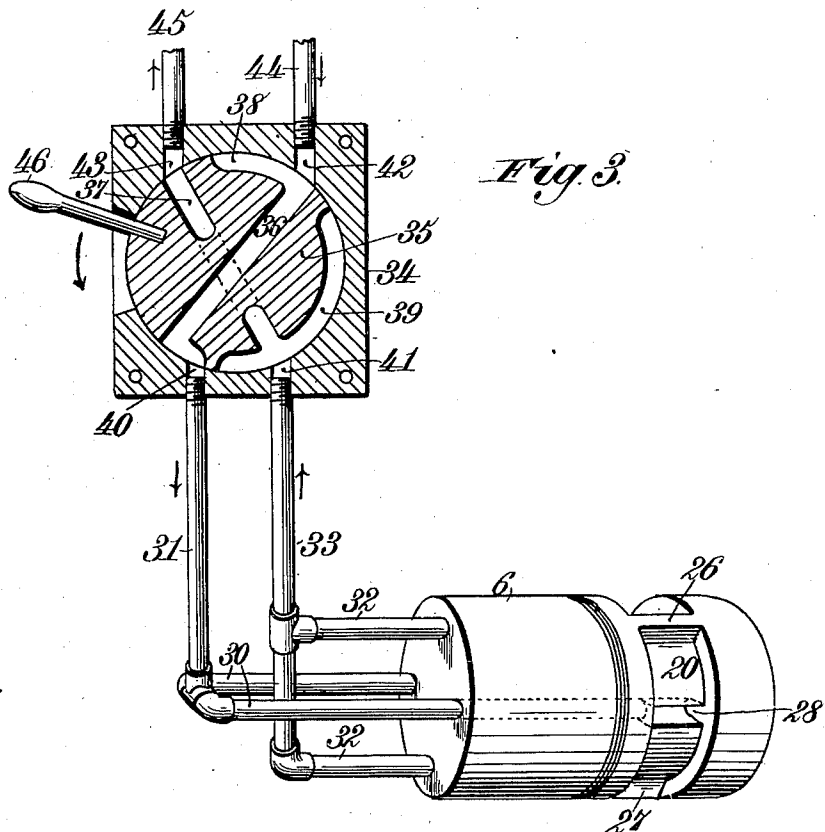


Fig. 3.

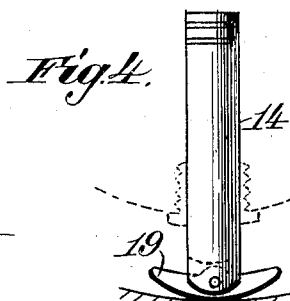


Fig. 4.

Witnesses,
Robert E. Smith
J. B. Keefe

Inventors,
Charles H. Asling
Albert Helms
By *James L. Norris*
Atty.

UNITED STATES PATENT OFFICE.

CHARLES H. ASLING AND ALBERT HELMS, OF SILOAM SPRINGS, ARKANSAS.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 663,716, dated December 11, 1900.

Application filed April 7, 1900. Serial No. 12,007. (No model.)

To all whom it may concern:

Be it known that we, CHARLES H. ASLING and ALBERT HELMS, citizens of the United States, residing at Siloam Springs, in the county of Benton and State of Arkansas, have invented new and useful Improvements in Rotary Engines, of which the following is a specification.

This invention relates to rotary engines, and especially to that type wherein a plurality of cylinders radiate from a common steam and exhaust chamber, pistons being arranged in said cylinders and carrying at their outer ends shoes which are forced outward against inclined faces formed on the interior of the engine-casing, and thereby communicate to the engine rotary motion.

Our invention has for its object to provide an engine of the character described with a novel mechanism so constructed and arranged that while the steam is forcing outward one set of pistons to rotate the engine a corresponding set of pistons is being exhausted or retracted, whereby the steam acts at all times, when the engine is running, on one set of pistons with a direct pressure to produce a continuous rotary movement that will be entirely independent of the momentum of the engine.

It also has for its object to provide such an engine with improved reversing mechanism by means of which the engine may be instantly reversed at will.

To these ends our invention consists in the features and in the construction, combination, and arrangement of parts hereinafter described, and particularly pointed out in the claims following the description, reference being had to the accompanying drawings, forming a part of this specification, wherein—

Figure 1 is a vertical central sectional view of our improved invention. Fig. 2 is a partial transverse sectional view, also illustrating the reversing-valve. Fig. 3 is a partial sectional and perspective view illustrating the reversing-valve and the ported cylinder and their connections, and Fig. 4 is a detail view illustrating a modified form of piston-shoe.

Referring to the drawings, the numeral 1 indicates the engine-casing, preferably having the general shape of a cylinder and formed with a base 2, adapted to be rigidly fixed to any suitable bed or support.

As shown, the casing is hollow and its interior is shaped to present two curved surfaces or faces 3 and 4, each comprising a fraction of a circle and each forming one-half of the interior of the casing. Each of the curved faces 3 and 4 forms more than a semicircle and their centers lie on diametrically opposite sides of the center of the casing 1, whereby their meeting ends form apices 5, which also lie on opposite sides of the center of the casing. Passing centrally through the casing 1 is a fixed shaft 6, on which is journaled so as to freely rotate thereon a solid metallic wheel 7, which is provided with a laterally-projecting hub 8. In the hub 8 one end of the line or driven shaft 9 is fitted and is fixed therein by means of set-screws 10. Bored or otherwise suitably formed in the wheel 7 are four cylindrical bores or sockets 11, which are arranged at right angles to one another and form steam-cylinders, said cylinders extending through the periphery of the wheel and terminating at their inner ends in contracted ports 12, and in the outer ends of said cylinders are fitted annular packings or bushings 13, of brass or other metal suitable for the purpose, hereinafter described. Arranged to reciprocate in the cylinders 11 are pistons 14, 15, 16, and 17, each provided at its inner end with packings or piston-heads 18 and at its outer end with a shoe, which may either consist of a roller 18, journaled in the end of the piston, or of a shoe 19, beveled at its opposite ends and pivoted to the end of the piston. Either form of this part of the invention constitutes a pivoted shoe which is arranged to contact with the inner curved faces of the casing and freely move over the same.

With a view to preventing wear the interior of the casing 1 should be chilled or otherwise suitably hardened or the same may be lined with steel.

Formed in the periphery of the shaft 6 at the inner end of the latter are four ports 20, 21, 22, and 23, which are adapted to simultaneously register with all four of the cylinders 11, the circumferential portions 24, 25, 26, and 27 of said shaft lying between the ports forming cut-offs, as will more fully hereinafter appear. Formed in the shaft 6 are two longitudinal ducts or channels 28, that commu-

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 5 nicate at their inner ends with the ports 20 and 21, and two similar ducts or channels 29, that communicate at their inner ends with the ports 22 and 23. Pipes 30 lead from the outer ends of the ducts 28 and are coupled to a common pipe 31, and in like manner pipes 32 lead from the ducts 29 and are coupled to a common pipe 33.

10 The numeral 34 indicates a rotary valve-casing in which is fitted a rotatable cylindrical valve 35. Passing transversely through the valve 35 at approximately right angles to each other are two ducts or ports 36 and 37, each terminating at one end in a peripheral extension, said extensions being respectively indicated by the numerals 38 and 39. Formed in the valve-casing is a port or duct 40, in which is fitted the pipe 31, and a similar port or duct 41, in which is fitted the pipe 33. Opposite the ducts 40 and 41 are formed corresponding ducts 42 and 43, in the former of which is fitted a steam-pipe 44, that leads from the boiler, (not shown,) and in the latter an exhaust-pipe 45. The valve 35 is provided with a handle 46, by means of which it may be conveniently turned, suitable stops of any desired construction being provided to limit the rotary movement of the valve in either direction. The extensions 38 and 39 of the ports 36 and 37 are of such length that when the valve is turned to the position shown in Fig. 3 of the drawings the steam from the pipe 44 will pass through the port 36 into the pipe 31 and through the latter and the pipes 30 and ducts 28 into the ports 20 and 21 and from the latter into two of the cylinders 11 that may for the time being register with said ports. In the same manner the exhaust from the other two cylinders will pass through the ports 22 and 23 and thence through the ducts 29 into and through the pipes 32 33 and valve-port 37 and out through the exhaust-pipe 45. If the valve be given a partial rotation in the direction indicated by the arrow, it will be readily seen that the port 36 will then communicate with the pipes 31 and 45 and the port 37, or its extension 39 will communicate with the pipes 33 and 44, and the passage of the live and exhaust steam will be reversed.

50 The operation of our improved engine is as follows: Let it be assumed that the engine is in the position shown in Fig. 1 and that the reversing-valve is in the position shown in Fig. 3 of the drawings. Then the steam passing to the ports 20 and 21 in the manner above described will pass into the cylinders behind the pistons 14 and 15 and will force the shoes carried by the latter against the outwardly-curved portions 47 of the curved faces 3 and 4 of the casing. The shoes will thus be bearing in an oblique direction against two oppositely-inclined surfaces, and hence will be caused to rotate in the direction of the arrow shown in Fig. 1. At the same time the shoes carried by the pistons 16 and 17 will be sliding over the inwardly-curved surfaces 48 of the interior of the casing, and said pistons will

consequently be forced inward; but as the cylinders containing the pistons 16 and 17 are in communication with the ports 22 and 23 the steam behind said pistons will exhaust out through said ports and to the exhaust-pipe in the manner before described. When the ends of the pistons 16 and 17, respectively, reach the apices 5, the ends of the pistons 14 and 15 will be at points midway between said apices or just about to leave the outwardly-curved faces 47 and travel upon the inwardly-curved faces 48, and at such time the ports 12 at the inner ends of the cylinders in which work the pistons 14 and 15 will be crossing over the adjacent cut-offs 26 and 27 and commencing to place said cylinders into communication with the ports 22 and 23, through which latter the said cylinders will be exhausted. As the shoes carried by the pistons 16 and 17 ride past the apices 5 their cylinders will be put into communication with the ports 20 and 21 and will act against the inclined faces 47 in the manner before described and continue to rotate the wheel 7 in the direction indicated by the arrow. In this manner two of the pistons will at all times be operating to rotate the engine, while simultaneously the other two will be exhausting, whereby the force of the steam is at all times operating on one set of pistons to drive the engine and the momentum of the latter is not depended upon to actuate the engine during a portion of its rotation.

100 It will be readily understood that if the valve be turned to cause the port 37 to register with the pipes 33 and 44 and the port 36 to register with the pipes 31 and 45 the ports 22 and 23 will then become admission-ports and the ports 20 and 21 exhaust-ports, and hence the direction of rotation of the wheel 7 will be reversed. It will also be evident that if the valve 35 be turned to a position intermediate the two positions described the duct 42 will be closed and the steam be cut off from the engine and the latter stopped.

105 We have described our improved engine as being driven by steam; but it will of course be understood that it may be driven by compressed air or other suitable fluid-pressure.

Having described our invention, what we claim is—

1. In a rotary engine, the combination with a hollow casing provided with two similar internally-curved faces arranged opposite to each other, said curved faces being each greater than a semicircle and disposed eccentrically to the axial center of the casing, of four radial cylinders arranged to rotate in unison about the axial center of the casing, pistons fitted to reciprocate in said cylinders and carrying shoes at their outer ends adapted to contact with the curved faces of the casing, and means for admitting steam behind two opposite pistons and simultaneously exhausting it from the other two pistons, substantially as described.

2. In a rotary engine, the combination with

a casing provided with two similar internally-curved faces arranged opposite to each other, said curved faces being each greater than a semicircle and disposed eccentrically on opposite sides of the axial center of the casing, of four radial cylinders disposed at right angles to one another and arranged to rotate in unison about the axial center of the casing, pistons fitted to reciprocate in said cylinders and provided at their outer ends with pivoted shoes adapted to contact with the curved faces of the casing, and means for admitting steam behind two of the pistons as they recede from the highest portions of the curved faces and for exhausting the steam from behind the other two pistons as they recede from the lowest portions of said faces, substantially as described.

3. In a rotary engine, the combination with a casing provided with two similar internally-curved faces arranged opposite to each other, said curved faces being each greater than a semicircle and disposed eccentrically to the axial center of the casing, of a fixed shaft arranged centrally in the casing and provided with four circumferential ports formed at equal distances apart, four radial cylinders arranged to rotate in unison on said shaft and constructed to simultaneously register at their inner ends with said ports, pistons fitted to reciprocate in said cylinders and provided with shoes at their outer ends adapted to contact with the curved faces of the casing, and means for admitting steam to two of the opposite ports and simultaneously exhausting it from the other two ports, substantially as described.

4. In a rotary engine, the combination with a casing provided with two similar internally-curved faces arranged opposite to each other, said curved faces being each greater than a semicircle and disposed eccentrically to the axial center of the casing, of a fixed shaft arranged centrally in the casing and provided with four circumferential ports formed at equal distances apart, four radial cylinders arranged to rotate in unison on said shaft and constructed to simultaneously register at their inner ends with said ports, pistons fitted to reciprocate in said cylinders and provided at their outer ends with shoes adapted to contact with the curved faces of the casing, means for admitting steam to two of the opposite ports and simultaneously exhausting it from the other two ports, and means for reversing the admission and exhaust of said ports, substantially as described.

5. In a rotary engine, the combination with a casing provided with two similar internally-curved faces arranged opposite to each other, said curved faces being each greater than a semicircle and disposed eccentrically to the axial center of the casing, of a shaft fixed centrally in the casing and provided with four ports each extending around nearly one-quarter the circumference of the shaft, four radial cylinders arranged to rotate in unison on said

shaft and constructed to register at their inner ends with said ports, pistons fitted to reciprocate in said cylinders and provided at their outer ends with shoes adapted to contact with the curved faces of the casing, means for admitting steam to two of the opposite ports and simultaneously exhausting it from the other two ports, and means for reversing the passage of the steam through said ports, substantially as described.

6. In a rotary engine, the combination with a casing provided with two similar internally-curved faces arranged opposite to each other, said curved faces being each greater than a semicircle and disposed eccentrically to the axial center of the casing, of a shaft fixed centrally in the casing and provided with four ports each extending around nearly one-fourth the circumference of the shaft and separated by narrow cut-offs, four radial cylinders arranged to rotate in unison on said shaft and provided at their inner ends with contracted ports arranged to simultaneously register with the ports in the shaft, pistons fitted to reciprocate in the cylinders and provided at their outer ends with shoes adapted to contact with the curved faces of the casing, a valve for simultaneously admitting steam to two of the opposite ports in the shaft and exhausting it from the other two of said valves, and means for reversing the valve, substantially as described.

7. In a rotary engine, the combination with a closed casing provided with two similar internally-curved faces arranged opposite to each other, said curved faces being each greater than a semicircle and disposed eccentrically to the axial center of the casing, of a shaft fixed centrally in the casing and provided with four circumferential ports, four radial cylinders arranged to rotate in unison on said shaft and provided centrally with a hub, said cylinders being adapted to register with the said ports, a line-shaft fixed to the hub, pistons fitted to reciprocate in the cylinders and provided at their outer ends with shoes adapted to contact with the curved faces of the casing, a valve for simultaneously admitting steam to two of the opposite ports in the shaft and exhausting it from the other two of said valves, substantially as described.

8. In a rotary engine, the combination with a casing provided with two similar internally-curved faces arranged opposite to each other, said curved faces being each greater than a semicircle and disposed eccentrically to the axial center of the casing, of a shaft fixed centrally in the casing and provided with four circumferential ports, a wheel rotatably mounted on the shaft and having formed therein four radial cylinders disposed at right angles to one another, said cylinders being adapted to register at their inner ends with said ports, pistons fitted to reciprocate in the cylinders and provided at their outer ends with shoes adapted to contact with the curved

faces of the casing, a valve for simultaneously admitting steam to two of the opposite ports in the shaft and exhausting it from the other two of said valves, and a line-shaft
5 fixed centrally to and rotating with the said wheel, substantially as described.

In testimony whereof we have hereunto set

our hands in presence of two subscribing witnesses.

CHARLES H. ASLING.
ALBERT HELMS.

Witnesses:

R. S. MORRIS,
H. TANNEHILL.