JAMES P. HERRON.

ROTARY ENGINE.

111538 for STEAM, AIR or WATER. PATENTED FEB 7 1871

Fig. 1.

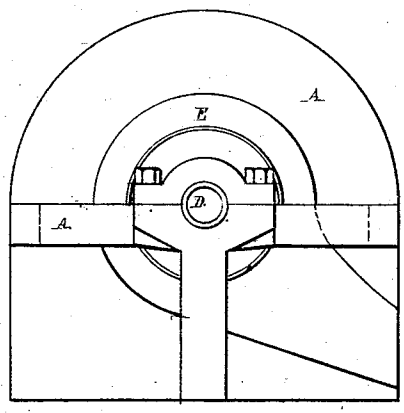

Fig. 2.

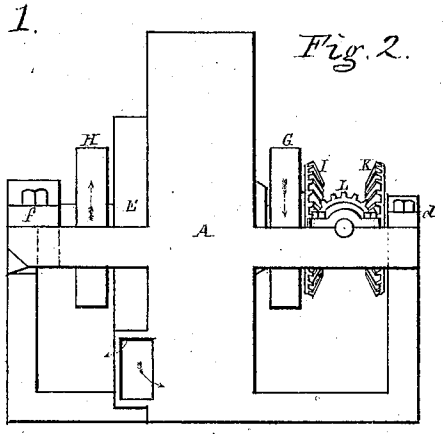

Fig. 3.

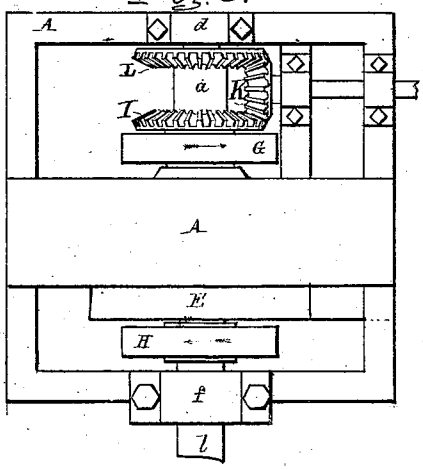

Fig. 4.

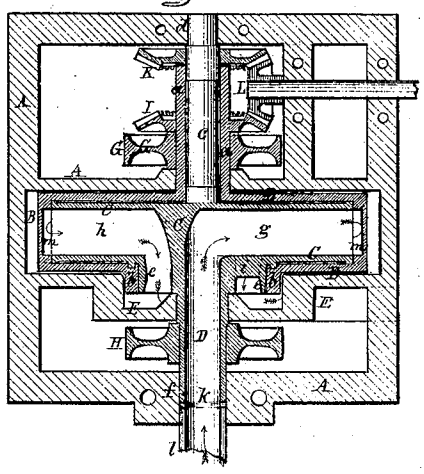

Fig. 5.

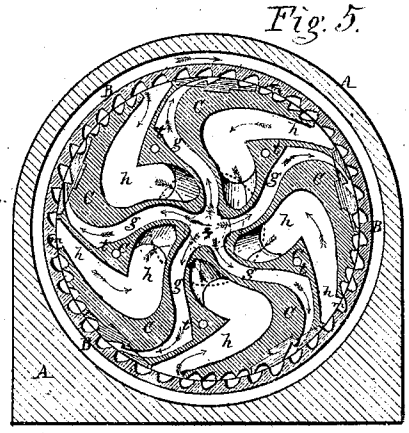

Fig. 6.

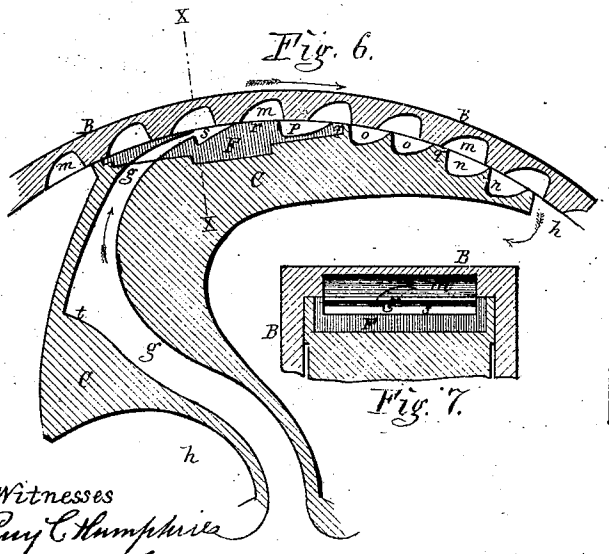

Fig. 7.

Witnesses
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JAMES P. HERRON, OF ATLANTA, GEORGIA.

IMPROVEMENT IN DOUBLE-ACTING ROTARY ENGINES.

Specification forming part of Letters Patent No. **111,538**, dated February 7, 1871; antedated January 30, 1871.

To all whom it may concern:

Be it known that I, JAMES P. HERRON, of Atlanta, in the county of Fulton and State of Georgia, have invented a Double-Acting Rotary Engine for Steam, Air, or Water; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the annexed drawings, making part of this specification, in which—

Figure 1 is a side elevation, and Fig. 2 an end view, of my invention. Fig. 3 is a plan or top view. Fig. 4 is a horizontal section through the axis of the machine, showing on the right of the axis the induction and on the left the escape channel for the agent used. Fig. 5 is a vertical central section of the engine in a plane at right angles with the axis. Fig. 6 is an enlarged section of a portion of the machine in the same plane as Fig. 5, and Fig. 7 is a section on the line X X of Fig. 6.

In all the figures like parts are indicated by the same letters of reference.

The nature of my invention consists in the arrangement and combination of two concentric wheels, one incased within the other, and each being free to revolve on its own axis in such a manner that a motive power admitted to the inner wheel through its axle shall, by impact and reaction, impart motion to both wheels in opposite directions, and continue to react until it is permitted to escape, which it does by returning through channels in the same wheel to near the center, and that steam or condensed air shall, first by impact and then by expansion, produce the same motion and maintain and accelerate it, while no escape of the agent employed can possibly take place through the engine unless it is in motion.

It further consists in the means, to be hereinafter described, of causing the turning of the two wheels in different directions to produce the continuous revolution of a shaft in one direction, which shaft may bear a pulley, crank, or other device for imparting motion.

In the drawings, A A is the frame and casing of my double-acting rotary engine. B, Figs. 4 and 5, is a hollow cylinder constituting the external wheel. From one plate of this cylinder extends a hollow shaft, *a*, Fig. 4, with which the wheel revolves in a manner to be presently described. From the plate on the opposite side of the wheel B projects the annular flange *b*, constituting a collar for the support of the wheel on that side, as will be more fully set forth.

C is the internal wheel, and is a cylinder turned to fit the inside of the hollow cylinder so exactly as to be near steam-tight, and at the same time perfectly free. The wheel C has a spindle, *c*, projecting from one side, which passes through and is fitted to the hollow shaft *a* of the wheel B, thus affording it a bearing, and terminates in a journal having a bearing at *d*, Figs. 3 and 4.

From the opposite side of the wheel C projects a flange or rim, *e*, turned to fit the inside of the collar *b* of the wheel B, so that one may turn freely around the other without any loose play. From the same side of the wheel C with the rim *e* projects the hollow axle D, terminating about the middle of a journal-bearing at *f*. The space in the hollow axle D communicates with channels *g*, formed in the body of the wheel C, of about the shape and proportions shown in Figs. 5 and 6. Their relative depth and the thickness of metal which covers them on each side are shown in Figs. 4 and 7, and they extend to the periphery of the wheel, where they terminate in a narrow slit or opening. (Shown in Figs. 5, 6, and 7.) The number of these channels may be varied; but I have adopted, and therefore show in the drawings, five. These are the induction-channels. In the body of the wheel C, between the channels *g*, are larger and differently-shaped channels, *h*, which are for the escape of exhaust of steam or other motive power, and which extend from the periphery of the wheel, where they are wider than the openings *g*, (see Fig. 5,) to the space between the outside of the axle D and the inside of the rim *e*, as shown distinctly in Fig. 4. The space within the rim *e* is shown in Fig. 5 by a dotted circle. That portion of each of the channels *g* which crosses this space is covered by a plate, as shown at *i*, Fig. 4, to preserve its connection with the hollow axle D, and to insure that no communication can exist between the supply and exhaust channels except at the periphery of the wheel. In the journal-box *f* a ring-packing, *k*, of any suitable material, is placed, to lessen the wear of the end of the axle as it revolves against the end of the steam-pipe *l*. On the casing A, and cov-

ering the escape or exhaust openings around the axle D, is secured a circular box, E, Figs. 1, 2, 3, and 4, having a trunk or channel to conduct the escape away to any point desired. On the inner surface of the wheel B are cavities *m m*, (shown in Figs. 4 and 5, and most distinctly in Figs. 6, 7,) with smooth spaces between of a width about half of the cavity. The cavity is a groove extending nearly across the inner face of the wheel B, being equal in length to the depth of the channels *g h*, having one straight side a little inclined from a radial direction, which is in fact a piston-head, and extending by a curved surface from its greatest depth to the line of the inner surface of the wheel B. On the periphery of the wheel C, between the outlet of the channel *g* and the escape-opening *h*, are similar piston-headed grooves, *n n*, *o o*, *p*, Figs. 5, 6, and 7, but arranged in pairs, each pair being of a different depth from the others. Thus the grooves *n n*, near the escape, are the deepest, and are separated from each other by a sharp edge. The grooves *o o* are separated from the grooves *n* and the groove *p* by a short extent of the smooth surface of the wheel C, as shown at *q*, and from each other by a sharp edge, and they are less in depth than the grooves *n*. The groove *p* is shallower again than *o*. Between this groove and the outlet of the channel *g* is a smooth portion of the surface of the wheel C, forming a cut-off, *r*, a very little less in extent than the width of a groove *m*, so that when the cut-off has reached the left-hand edge of a groove *m* its right hand edge will have passed the corner of the groove *p*. The outlet of a channel *g* terminates in the piston-head face of a groove, *s*, one side of which rises from its bottom with a slope or a curve until it meets the left-hand edge of the cut-off *r*, as shown in Fig. 6. The outlet of the channel *g* and the grooves *s* and *p* are formed in a packing-block, F, of steel or other material adapted to wear well, which is let into the face of the wheel C at these points, as shown in Figs. 6 and 7. Fitting closely, but with capacity to move freely, it will be forced outward by the motive agent, and always kept in contact with the inner surface of the wheel B, and thus keep the engine effectually packed until it wears out. The number of piston-headed grooves *m m* in the wheel B is such that no two of them can act or be acted on in the same manner at the same instant. In the drawings they are forty-two in number.

G is a pulley fast on the hollow shaft *a* of the wheel B, and revolves with it. H is another pulley fast on the hollow axle D of the wheel C. Their difference in direction of motion is indicated by the arrows in Figs. 2 and 3. On the shaft *a* is also secured fast the bevel-wheel I, and on the end of the spindle *c* is a similar bevel-gear, K. These wheels engage with and turn the bevel-pinion L, which by its shaft may give motion where required.

The operation of my double-acting rotary engine is as follows, viz: Steam or condensed air, being admitted to the hollow axle D, is imparted through the channel *g* upon the straight side or piston head of a groove, *m*, in the wheel B. The shape of the channel *g* permits the motor to react upon its wall at that point in its length marked *t*, and the two wheels immediately revolve in contrary directions. That of the wheel B is indicated by the arrow above it in Figs. 5 and 6. As the wheels continue to revolve, the steam or condensed air which has been forced into the grooves *m* is successively shut off, so that it will expand between the piston-heads of the grooves *p o n* and grooves *m* until these last arrive opposite the outer end of the escape-channels *h*, when the motor will flow out.

The arrows in Figs. 4, 5, and 6 indicate the course of the escape. In Figs. 4 and 5 they show, by the absence of their heads, how the motor passes through the annular space around the axle D into the box E and away. Belts from the different pulleys will give motion where required. The outside casing, A, is not essential to the construction of the machine, as the escape can be conveyed away by a channel from a box covering the flange *b* of the wheel B, and the engine may be set with its axis vertical or horizontal.

The arrangement herein described of the bevel-gearing utilizes the motion of both the wheels B and C by balancing the power exerted upon the driven pinion, and equalizes the pressure of the pinion-shaft on its bearings.

If desired for the increase of speed or any other purpose, the engine may be operated with either the cylinder B or wheel C stationary.

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

1. The wheel C, having inlet-channels *g* to receive steam through the hollow shaft D, and exhaust-channels *h* to discharge steam near its center, in combination with a wheel, B, provided with piston-headed grooves for the purpose of causing one wheel to turn by impact and the other by reaction, substantially as set forth.

2. The wheels B and C, both provided with piston-headed grooves operating in combination, substantially as described, for the purpose of allowing steam or air to assist in turning both wheels by expansion, as set forth.

3. The construction and arrangement of the packing-block F, operating substantially as described and shown.

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Witnesses:
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