O. STENBERG.
Rotary-Engine

No. 202,884. Patented April 23, 1878.

Fig. 1

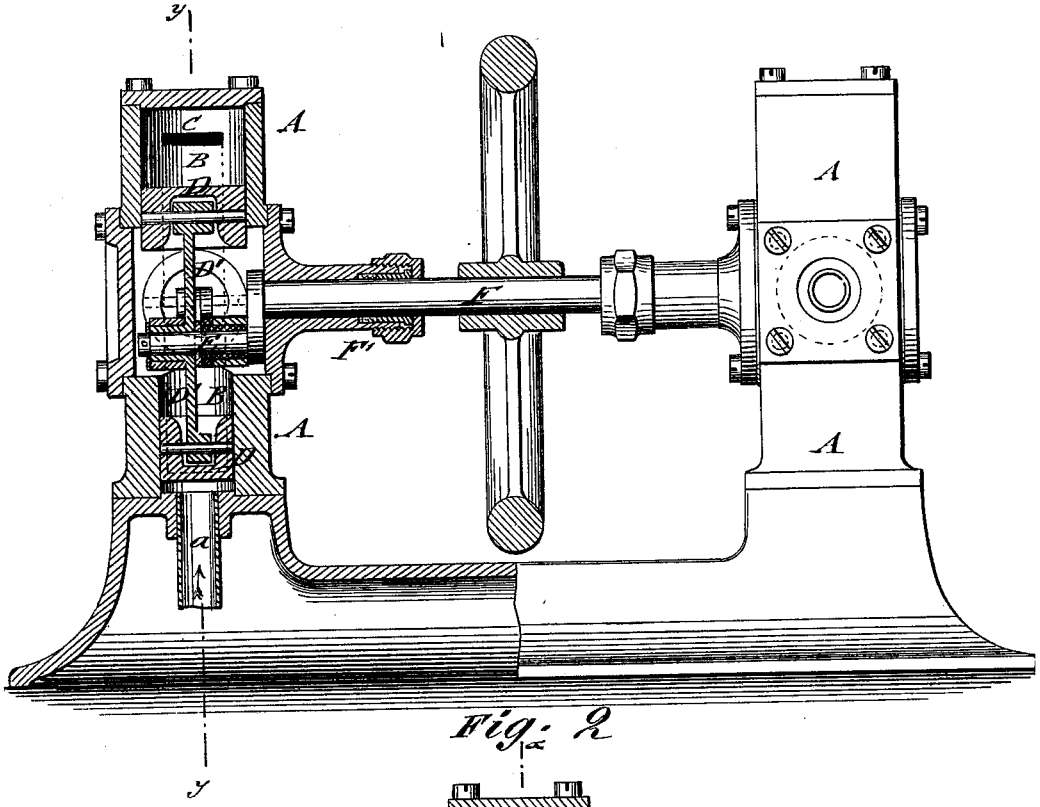
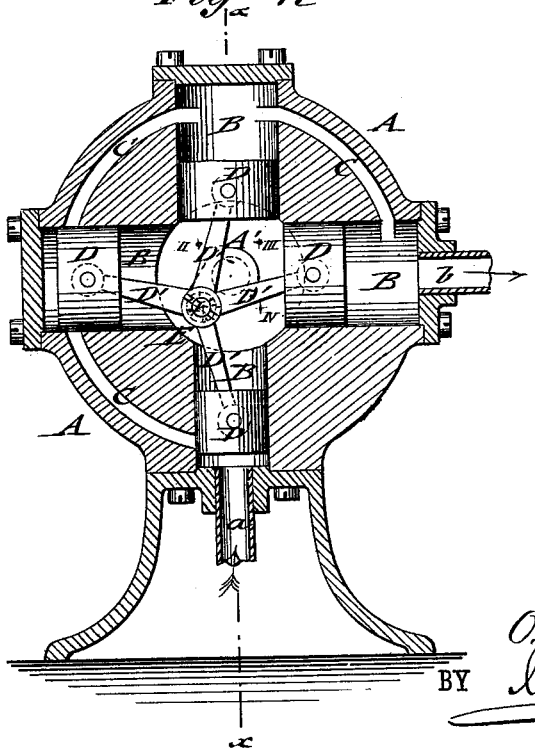


Fig. 2



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UNITED STATES PATENT OFFICE.

OSCAR STENBERG, OF HELSINGFORS, FINLAND, RUSSIA, ASSIGNOR TO JULIUS BLANCKE, OF MERSEBURG, GERMANY.

IMPROVEMENT IN ROTARY ENGINES.

Specification forming part of Letters Patent No. **202,884**, dated April 23, 1878; application filed March 21, 1878.

To all whom it may concern:

Be it known that I, OSCAR STENBERG, of Helsingfors, Finland, Russia, have invented a new and Improved Rotary Engine, of which the following is a specification:

In the accompanying drawing, Figure 1 represents a side elevation of my improved rotary engine, partly in section, on line *x x*, Fig. 2; and Fig. 2 is a vertical longitudinal section through the casing of the engine on line *y y*, Fig. 1.

Similar letters of reference indicate corresponding parts.

The invention relates to an improved rotary engine or pump that is based on the differential action of a number of pistons acted upon successively by the steam or water, so as to revolve a common crank coupled to the pistons; and the invention consists of a casing with four interior cylinders at right angles to each other, and connected by a channel or duct with each other, in combination with entrance and discharge ports, and four successively-acting pistons that are coupled to the wrist-pin of a common crank at the interior end of a shaft turning in a suitable stuffing-box of the cylinder-casing.

Referring to the drawing, A represents a casing of cylindrical shape, which is provided at the interior with a central cylindrical space, A′, from which radiate four hollow cylinders, B, whose axes are at right angles to each other. The cylinders are connected by a channel, C, that leads from the first or lower cylinder to the one next adjoining; then to the third, and, finally, to the fourth cylinder, the steam entering through a port, *a*, of the first cylinder, and expanding and discharging through the exhaust-port *b* of the fourth cylinder. Each cylinder B is provided with a piston, D, that is connected by a pivoted rod, D′, with a common crank-pin, E, to which all the four pistons are coupled. The outside end of each cylinder is closed by tightly-packed end plates, also the interior connecting-space A′ by side plates, of which that side plate through which the crank-shaft F passes is provided with a stuffing-box, F′, to prevent any escape of the steam or water. The supply-port *a* is arranged in the bottom of the casing, and with an exhaust-port, *b*, in the end plate of the fourth cylinder. The lower piston and cylinder is equal to one-half of the area of the remaining pistons, for the purpose of enabling the diametrically-opposite piston to overpower the smaller piston, and work thereby with the same force on the crank when the steam acts thereon.

The working of the machine as a rotary steam-engine is as follows: When the crank-pin is in its first position, marked I, as shown in the drawing, the first and second pistons shut off the connecting-channel C, steam being admitted through the supply-port *a*. The first piston is then moved so that the channel is opened, and steam admitted thereto, and the crank-pin moved through one quarter of its revolution into its second position, marked II in Fig. 2. As soon as the crank-pin is beyond the point II the second piston opens the channel, and allows the steam to enter into the second cylinder, so as to work on the second piston, while at the same time the third piston shuts the channel in the third cylinder. The action of the steam on the second piston throws the same back, and moves the crank around the second quarter of its revolution to the point marked III in Fig. 2, the result being the opening of the supply-channel in the third cylinder. The steam can then work on the third piston, while at the same time the fourth piston closes the channel in the fourth cylinder. The crank now moves through the third quarter of its revolution to the point marked IIII, and is finally carried by the impetus given by the fly wheel of the crank-shaft through the remaining quarter of a full revolution into its first position, by which the channel in the fourth cylinder becomes open, so as to allow the steam to escape through the exhaust-port *b*. The machine then works again, as before described, the shaft completing its revolution by the successive admission of steam through the connecting-channel of the cylinders. The engine may also be worked by water-power in the same manner, and with equal facility, as by steam.

If the machine is to be used as a pump the crank-shaft is driven by some other power,

and the pistons are worked alternately as suction and force pistons, *a* being the suction-pipe, *b* the discharge-pipe. The machine may be also combined in many ways, as, for instance, two machines connected by the same crank-shaft, as shown in Fig. 1, so as to furnish a double engine, the cranks being in this case placed diametrically to each other, so that no dead-points are to be overcome.

In the same way two machines may be connected, and one used as a steam-engine, while the other is used as a pump, so as to furnish a steam-pump of very compact and effective construction.

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

1. In a rotary engine the combination of the solid casing having cylinders radiating from a common center space, also a connecting channel or duct, and supply and discharge ports, with pistons coupled to a common crank-pin, and revolved by the successive action of steam or water upon the same, substantially as and for the purpose set forth.

2. The combination of a casing having cylinders radiating from a center space at right angles to each other, a connecting-channel or duct, and supply and discharge ports, with pistons successively acted upon and coupled to a common crank, the piston of the first or entrance cylinder having but half the area of the diametrically-opposite piston, substantially as specified.

In testimony that I claim the foregoing I have hereunto set my hand this 20th day of December, 1877.

OSCAR STENBERG.

Witnesses:
WILH. ZIGENHORN,
RÜDOLF HUNLAND.