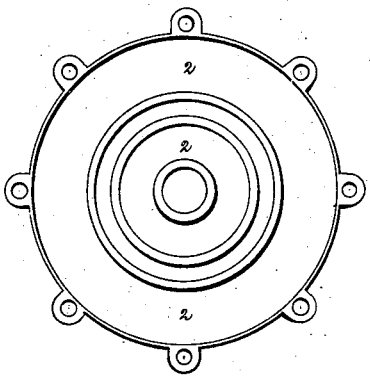
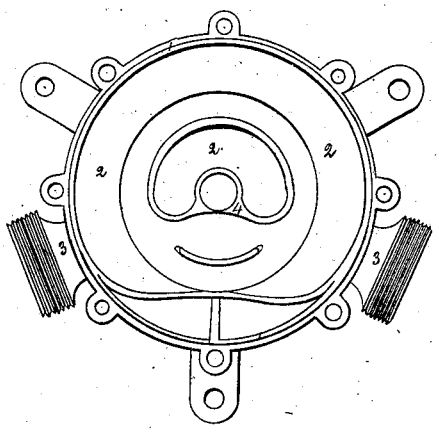
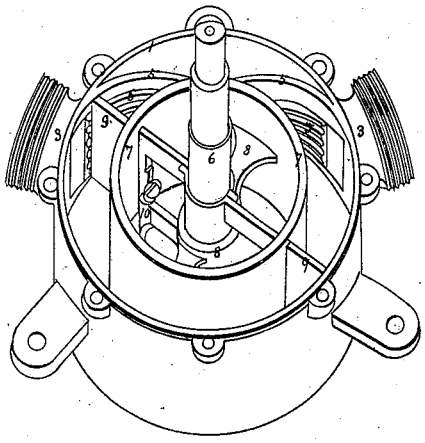
E. Hale,

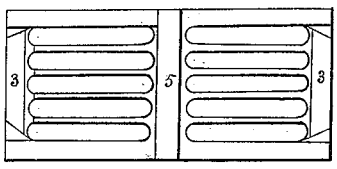
Rotary Pump,

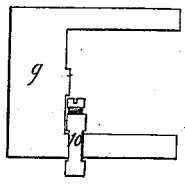
No. 4,853, Patented Nov. 14, 1846.











UNITED STATES PATENT OFFICE.

ELISHA HALE, OF NEWARK, NEW JERSEY.

WATER-WHEEL.

Specification of Letters Patent No. 4,853, dated November 14, 1846.

To all whom it may concern:

Be it known that I, ELISHA HALE, of the city of Newark, county of Essex, and State of New Jersey, have invented a new and useful rotary machine applicable as a steam-engine, fire-engine, suction and forcing pump, ventilator, and water-wheel, working either vertically or horizontally and the latter under or above the surface of the water and will work by the weight and power of the departing water, as well as by the head; and I do hereby declare that the following is a full and exact description of the construction and operation of the same, reference being had to the annexed drawings, making part of this specification.

This invention consists in constructing a rotary machine in the following manner together with the application of the machine to all the purposes above named.

It is made of cast metal, &c. as follows: A cylinder (marked on the drawing 1), is made of such length and diameter of circumference, as will be convenient for the use to which the machine is to be applied, one end is cast with it, or may be cast separately, in which case both ends (marked 2) will be alike screwed, or bolted to the cylinder. On this cylinder (1) are formed two apertures (as at 3) being apart, about equal to two fifths the circumference of the cylinder, and of suitable size to conduct on, and off, the steam water, &c. At the inside of the cylinder they will be nearly equal in length to that of the cylinder, and as narrow the other way as will do and give full space for the water &c. to pass; the exterior end of each being round, with a screw cut on it, or made square, or, of an oblong square, to fit the conducting pipe to be attached. On one or both of the end pieces of the cylinder (marked 2) at the inside, and around the center, is a raised circle (shown at 4) formed, about three-fifths of it, is a regular circle, and the other two-fifths of it elliptical, and this part of it, is formed on the side coming between the apertures (3), and so shaped as to conform to the curve of the block, and bring the valves into action at the point where they pass the aperture receiving the steam water, &c.

The block (marked 5) above alluded to, is affixed in the cylinder (1) between the two apertures; and the width of it equal to the length of the inside of the cylinder, and exactly filling between the two apertures, and two narrow parts of each end of it; at each edge, extend across each aperture, and are let into the cylinder at the point of each, the thickness of that part, leaving them even with the cylinder at the side of the aperture farthest from the center of the block and where its curve commences; and this to bring the valves into, and out of action; the block being curved in at its center to meet the inside of the channel and the outside of the wheel, and closely fitted to it; in each end of it, extending from near the center of the apertures are deep grooves made, to give place for the air, steam, or water to pass the end of the valves as they go out of, or come into action; the number and depth of the grooves should be proportionate to the size of the machine.

In the center of the cylinder is an axle, or shaft, (shown at 6) passing through the nave of the wheel, and each end of the cylinder, or through one end, and having a bearing in a prominence formed on the other. In this axle, at each end of the main part, viz, that within the cylinder, are made two mortises of suitable size for the narrow part of each valve to pass through side by side.

A wheel (shown at 7) is cast in cylindrical form, having two arms and nave (as at 8,) which wheel in length, is a little more than that of the inside of the cylinder in the channel, and having a bearing at each end entering into a groove formed in each end piece of the cylinder at the inside of the channel; the diameter of the wheel should be such as to suit the application of the machine; but as laid down in the drawing, is equal to two thirds the cavity of the cylinder, and closely fitted to the central part of the block; in the sides of the wheel between the two arms (8) are long narrow mortises, cast in, or cut through, and in length, equal to the width of the valves, and in width equal to their thickness; which valves pass through them and the axle, back and forth as the wheel moves.

Two valves (shown at 7) above referred to, are made thin, and of a flat surface, being nearly of a square form, on the outer line of each, having an open central part, also of nearly square form at one end, leaving a narrow part at each edge to pass through the mortises in the axle, and guide them as they move through the axle and

wheel, one end of each, that end working into the channel, is wide enough to equal the depth of the channel, and long enough to extend across it, and through the thickness of the side of the wheels; and rounded at the out end to conform to the curve in the block; which valves are fitted to pass freely through the mortises in the wheel, and also side by side through the mortises in the axle.

Two drivers (marked 10) being small longish pieces of metal, having a mortise through the center of each, to receive the narrow part of each valve, and a screw in the end of each driver to secure it to the narrow part of each valve at the lower edge, or that edge of it next to the elliptical and regular circle; which drivers move around with the wheel and valves, fitting closely to the outside of the elliptical and regular circle, and by the united form of the block to that of the ellipses, and by the drivers the valves are slid into and out of action, and by the drivers fitting to the regular circle, are kept in action from one aperture to the other, being a little more than half the distance around the channel, so that one of the two valves, is at any position of the wheel, in a situation for action.

This rotary machine is put together in the following way: The axle is slid into the nave of the wheel, and valves passed through the sides of the wheel, next, the drivers placed on the narrow part of the valves, then the valves slid through the axle side by side, after this the wheel and valves in it placed in the cylinder, bringing the drivers into the elliptical and regular groove made for them; after this, the valves, one by one, must be turned around so that the driver on it comes onto the regular part of the circle, and valves slid out, bringing the end against the cylinder, and supported there; next slide the drivers, one by one, in close against the regular circle, and hold it there by a suitable tool, till the screw in the upper end of it is turned close. After this, bolt on the other end of the cylinder, and the machine is ready for operation; and by applying power to the axle or shaft, or against the buckets, the wheel in the machine moves, (and that either way as desired) and the valves brought around, and the out end is by the curve in the block slid in the full width of the channel, bringing the end even with the outside of the wheel while it passes the center of the block; then and at that point the driver on the valve strikes the bottom of the ellipses, and drives it out, while the end of the valve follows the curve of the block, so, by that curve, and the ellipses is brought into action and by the driver and regular circle, kept in action from one aperture to the other. Should the out end of the valves wear, they can at any time, by turning the screws in the drivers, be slid out against the cylinder and be close again.

Although fixtures of various kinds for the different applications of this machine will be needed and used, still, as I do not claim any new ones, I have not added any in this specification. In applying this rotary machine as a water wheel, it will readily be seen that to make the power of the water in the pipe below the wheel at first start of the mill, (with all the machinery on) available, the pipe, or tube below the wheel, must be full of water, and retained there, by a gate or valve, at the bottom of the pipe, and that valve opened a little after the head gate is drawn. For heavy, or large machines, such as ventilators for ships, mines &c., or for water wheels, timber may be used for part of the structure.

In heavy machines of any kind named in this specification, there may be friction wheels added on the end of the drivers, of their diameter working against the ellipsis &c., to facilitate its action, and prevent wear. In small machines, beer pumps, &c., the ellipsis and circle connected, and drivers also, may be omitted, and a small lever and short spring, acting on the lever, attached to the arms of the wheel, and pressing against the inner part of the valves at the nave of the wheel, driving them into, and keeping them in action, and the grooved block, as before set forth, bring them in even with the surface of the wheel, while they pass the center of the block, and so, as aforesaid, into action again; and this latter process to save expense in building light articles of the kind.

What I claim as my invention, and desire to secure by Letters Patent, is—

Putting the valves into, and out of action, by the united effect of the attached drivers, the elliptical raised circle, and the grooved block; substantially as herein described.

In testimony whereof, I hereunto subscribe my name, this seventh day of November 1846.

ELISHA HALE.

Witnesses:
WM. ESTABROOK,
AUGUSTIN W. HALE.