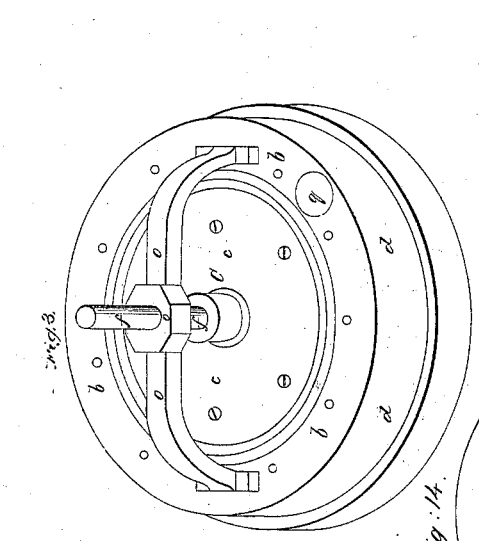
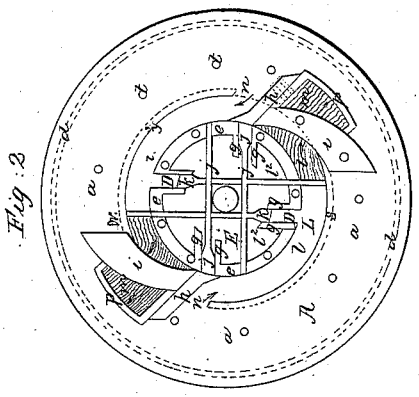
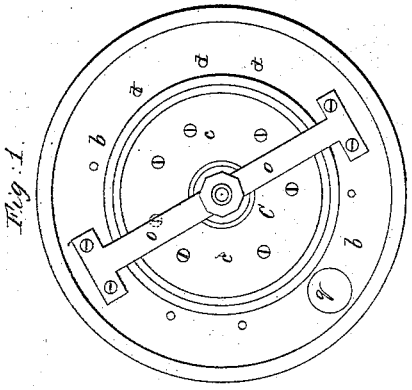
# Green & Evarts,

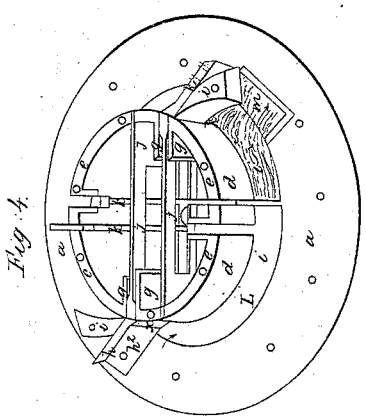
## Hydraulic Engine,

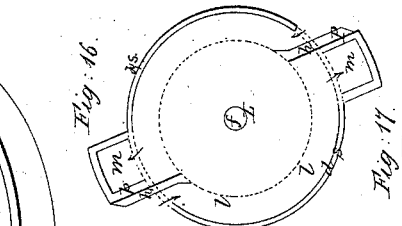
No. 2485. Patented Mar. 9, 1842.

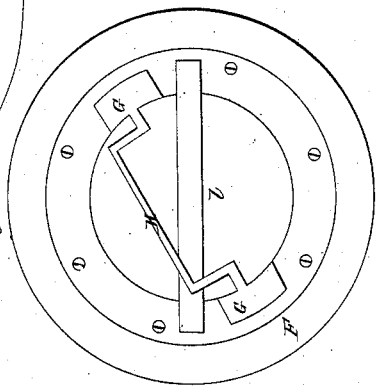


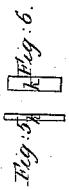


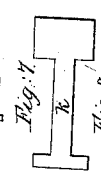


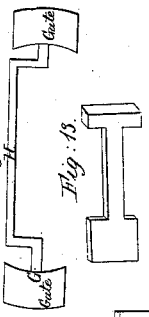


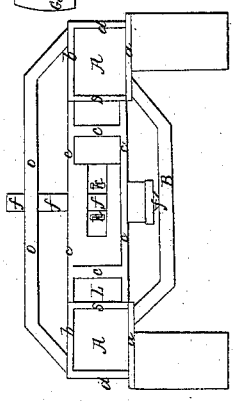


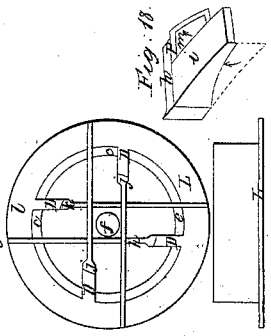


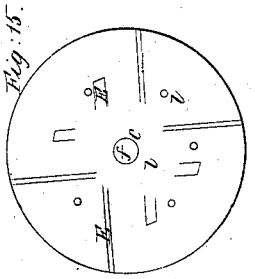












# UNITED STATES PATENT OFFICE.

P. H. GREEN AND H. H. EVARTS, OF MOUNT MORRIS, NEW YORK.

## CONSTRUCTION OF ROTARY ENGINES TO BE PROPELLED BY EITHER WATER OR STEAM.

Specification of Letters Patent No. 2,485, dated March 9, 1842.

*To all whom it may concern:*

Be it known that we, PECKHAM H. GREEN and HARRY H. EVARTS, of Mount Morris, Livingston county, State of New York, have invented a new and useful Engine for Propelling Machinery by Steam or Water Power, which is described as follows, reference being had to the annexed drawings of the same, making part of this specification, of which—

Figure 1 is a top view of the engine. Fig. 2 is a top view with the upper plate removed. Fig. 3 is a perspective view of Fig. 1. Fig. 4 is a perspective view of Fig. 2. Fig. 5 is a view of the narrow or small end of the piston *k*. Fig. 6 is a view of the wide or large end of the piston. Fig. 7 is a view of the piston *k*. Fig. 8 is a view of the wide end of the piston *j*. Fig. 9 is a view of the small end of the piston *j*. Fig. 10 is a side view of the piston *j*. Fig. 11 is a top view of the gates. Fig. 12 is a vertical section at the center. Fig. 13 is a perspective view of piston *k*. Fig. 14 view of the bottom of the engine showing the gates G. Fig. 15 under side of the top plate of the wheel and cylinder showing the grooves in which the pistons move. Fig. 16 plan of the cylinder and outlets. Fig. 17 plan of the wheel and grooves therein and pistons. Fig. 18 perspective view of the converging segment and adjustable head.

Similar letters refer to corresponding parts.

This machine consists of a hollow cylinder L in which is placed a revolving wheel *e* and around which cylinder is formed a circular chamber A by plates cast separately, or together and into which chamber the water is admitted and from which it is conducted through suitable apertures *n* in the rim *s* of the cylinder to the interior thereof where it acts on sliding pistons *j k* which are in length nearly equal to the diameter of the wheel *e* and which wheel is of less diameter than the diameter of the cylinder *t* in which it (the wheel) revolves, said pistons moving in parallel grooves on opposite sides of the shaft, one half of the number being at right angles to the other half which shaft is fixed to and turns with the wheel through which it passes in the center of the wheel and of the square formed by the crossings of the pistons and turning in a step on a bridge tree B at the bottom and in a box in a cap *o* at the top which retain it in a proper position, the aforesaid support for the upper bearing being a bar of iron *o* made in the form of a bow or a semi-oval with flanges at the extremities for screw bolts that secure it to the top plate of the chamber—the shaft of the wheel passing through the center of said bar as represented at *o* Fig. 3—two of said pistons *k* being of a shape resembling the letter I—in its side view as represented in Fig. 7 one end being made thicker than the other as seen in the perspective view Fig. 13, for the purpose hereafter described, and the other two *j* being made rectangular with large oblong mortises or openings in the center thereof as represented in Figs. 10 and 4 in which openings the stems or smaller parts of the first mentioned piston *k* move at right angles thereto as seen at Fig. 4 said pistons having each a wide and a narrow end as before stated producing an unequal pressure of the water on the two ends for the purpose of moving the piston out and across the cylinder presenting greater and lesser area, the greater area or larger end being pressed upon by the water in the cylinder pushes the piston out from the wheel forcing it through the water in the cylinder and across the same against the inside thereof in which position the piston is acted upon by the water admitted from the chamber A which passes through the inlet *n* from the chamber to the cylinder in the direction of the arrow and acts against the flat side of the piston at right angles thereto and drives it around in the cylinder until it arrives at a converging segment *i* as represented in Fig. 2 concave on the side next the wheel and straight or curved on the opposite side over which segment said small end is driven forcing the piston inward toward the wheel until it is even with the outer surface thereof which will take place when it arrives at the extremity of said segment *i* touching or nearly touching the periphery of the wheel, said segment being made oblique or inclined on the back against which is placed a sliding head *h* formed with a lip or projection *x* at the fore part against which the water acts forcing it against the circumference of the wheel and rendering the joints water tight. This converging segment for closing the pistons in the grooves of the wheel is made

of cast iron hollow on the under side over the outlet *m* as seen in Figs. 4 and 18, flat on top where it is screwed to the top plate of the chamber by screws passing through the apertures and straight on the end against which the adjustable head is placed. This head is a rectangular casting with an oblong mortise $h^2$ in its center to admit the screw bolt which attaches it to the end partition P of the outlet *m* and over which screw bolt it plays loosely so as to permit it to be forced by the water against the wheel—the water pressing against the aforesaid lip *x* which is cast on the end of the same next the wheel and brought to a feather edge at its outer extremity. The head also moves in grooves in the bottom and top plate of the chamber.

During the operation just described one of the opposite pistons will be forced out from its grooves in the wheel by the pressure of the fluid against its larger end and simultaneously with said movement the parallel piston to that just above mentioned will also be forced into its groove in the wheel by a similarly constructed converging segment as the one above mentioned arranged on the opposite side of the cylinder to that above described—the water commencing to escape from the cylinder through an opening *m* in the bottom plate just before the piston arrives at the segment *i* said opening or outlet *m* for the escape of the water being made of an oblong or other form in the bottom plate of the chamber below the segment which is made concave on the under side.

The mortises D Fig. 2 in the rim of the wheel are made oblong of the size of the several ends of the piston moving therein. The piston also moves in grooves in the top and bottom plates of the wheel and cylinder, said grooves for the piston being made on the surfaces of the plates next the inside of the cylinder. In Fig. 15 E represents the grooves in the top plates of the wheel.

The bottom plate L of the wheel is made of greater diameter than the wheel for the purpose of forming the bottom of the cylinder which it so forms at *l* Fig. 2.

The top plate C *c* of the wheel is made in like manner with the bottom plate L *l* and forms the top of the cylinder, the joints of the plates being rendered tight by suitable packing and the under side being grooved as before stated in which grooves the pistons slide. See E Fig. 15. The sides and ends of the pistons require no packing being pressed tight by the water. The other joints may be packed in the usual manner. The pistons may be increased in number at pleasure.

Suitable gates G may be adapted to the outlets *m* for shutting in and letting off the water which gates are made of the form and size of the outlets *m* in which they are placed having a crank shaft H passing through the center of the said gates with their extremities turning in suitable boxes in the foundation F. In Fig. 14 these gates are represented as shut. When they are open the edge only would be seen in this view.

The outlets *m* are partitioned from the chamber by suitable partitions P made the depth of the chamber the said partition having three sides, the fourth side next the cylinder being open. See Figs. 2 and 16.

The bottom and top of the chamber are composed of circular rims or plates *a b* secured to the upper and lower edges of the concentric rings *d s* forming the chamber; or said plates may be cast with them and perforated for the admission and discharge of the water by the perforations *m q*. This engine may be worked by steam as well as water and in a vertical or horizontal position.

When used as a hydraulic engine the water is admitted through a tube inserted into the aperture *q* in the top plate of the chamber. When used as a steam engine it must be provided with the usual steam chest, valves and tubes for letting on and shutting off the steam.

In describing the operation of the engine the fluid is said to press upon the large end of the piston forcing the smaller end out against the chamber on the opposite side but the description may not state with sufficient clearness how the pressure is removed from this large end of the piston at the time the piston is made to recede by the action of the cam *i*. We shall therefore give a further description of the operation of the pistons.

From the foregoing description it will be seen that the pistons are arranged in pairs, at right angles having their large and small ends alternately next each other, the operation being conjoint—that is to say when the small end of one pair of pistons say *h* in Fig. 2 approaches near the outlet *m* and is at the place marked *w* the small end of the nearest piston *j* of the next pair *j j* when it arrives at the place marked Y is pushed out by the pressure of the fluid against its larger end when at the place marked Z—receiving the pressure of the head of water against its flat sides next the inlet *n* at the same time removing the pressure of the head of water from the large end of the piston *h* of the first mentioned pair *h h* and allowing it to be receded into its groove by the action of the cam *i*, while the body of water which followed said piston is discharged at the outlet *m*, a similar effect being produced on the opposite side of the cylinder against the opposite ends of the pistons, a piston being always pushed out to receive the pressure of the head of water against its flat side just preceding the action of receding the

next piston in advance into its groove and the escape or discharge of the water following it.

What we claim as our invention and which we desire to secure by Letters Patent is—

1. The construction and arrangement of the pistons—that is to say with large and small ends as described and for the purpose set forth and crossing at right angles.

2. The method of moving the pistons out from the wheel and across the cylinder by the pressure of the water or steam upon the larger ends and the closing or rendering the joints tight by the pressure of the fluid as described.

3. The movable self adjustable heads *h* in combination with the converging segments or cams *i* against which they are placed and move as described.

4. The mode of constructing the circular chamber in combination with a revolving wheel and cylinder as before described—viz. in making the chamber with an inlet in its top for the admission of the water, openings in its side for the passage of the water to the interior of the cylinder and partitioned outlets in the bottom of said chamber for the discharge of the water.

Mount Morris Livingston county New York February 9th 1842.

PECKHAM H. GREEN.
HARRY H. EVARTS.

Witnesses:
A. G. Mordoff,
James W. Riggs.