

(No Model.)

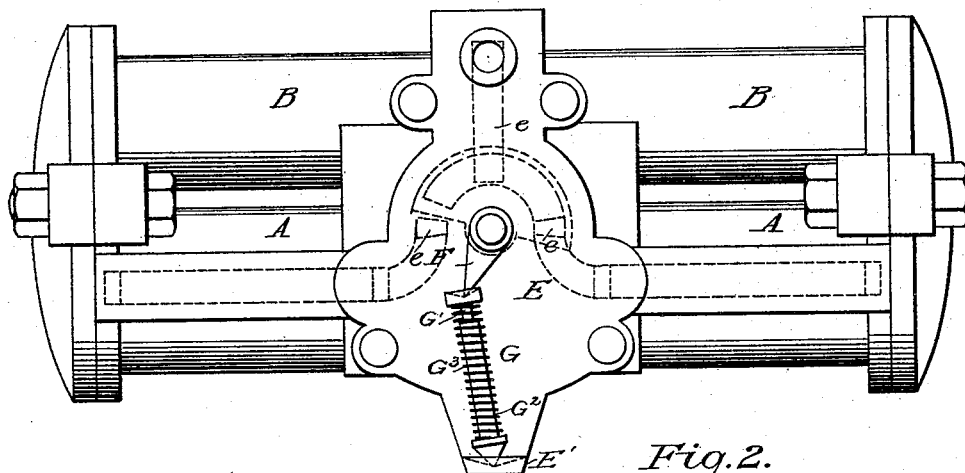
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G. R. KENDRICK.  
STEAM PUMP.

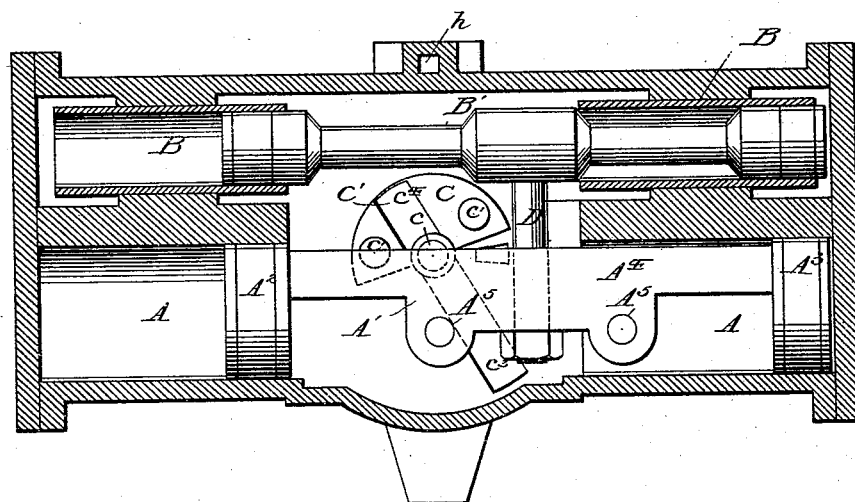
No. 494,207.

Patented Mar. 28, 1893.

*Fig. 1.*



*Fig. 2.*



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Attorney

Witnesses

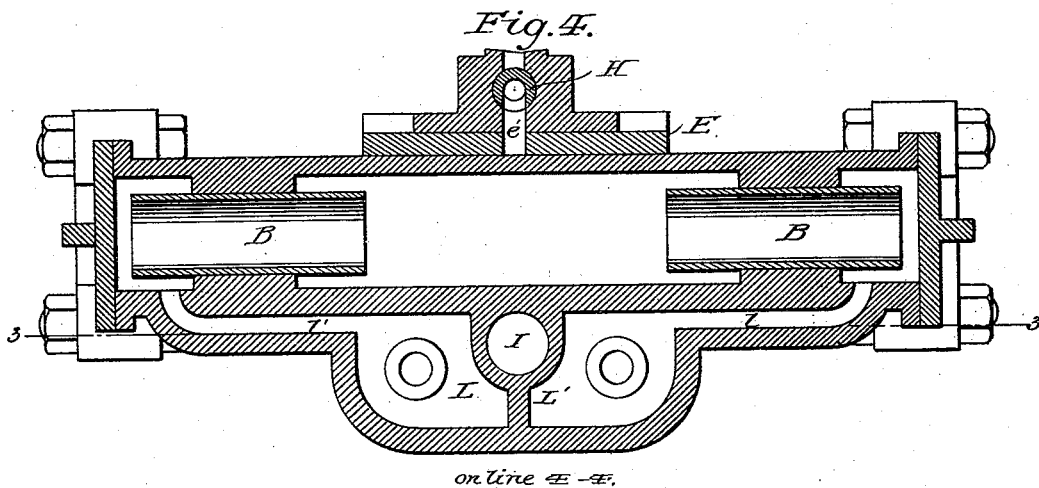
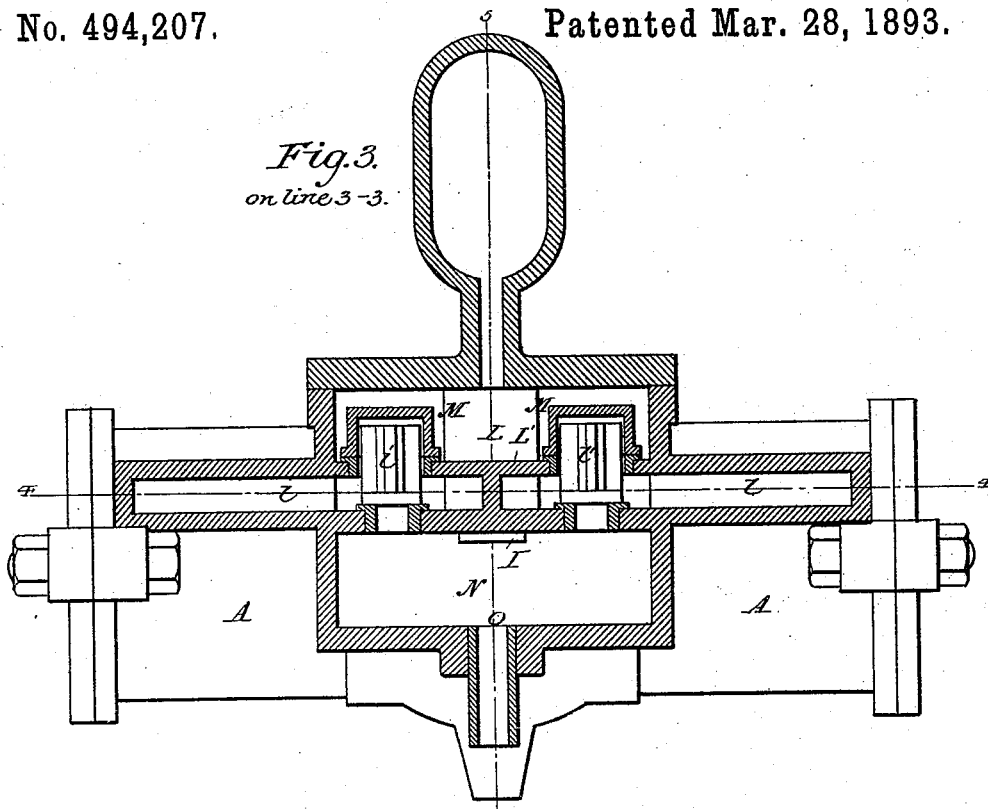
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(No Model.)

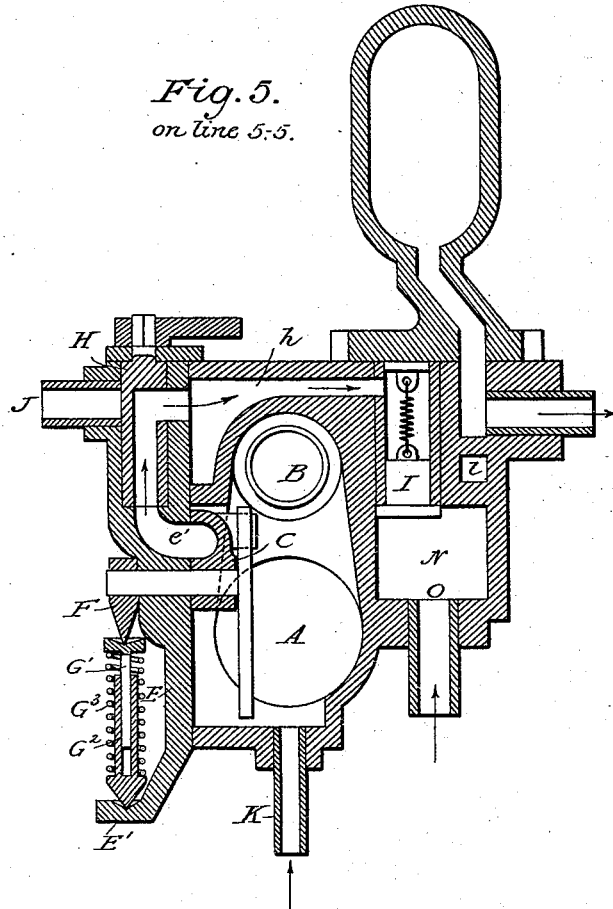
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*Fig. 5.*  
*on line 5-5.*



Witnesses,  
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# UNITED STATES PATENT OFFICE.

GEORGE R. KENDRICK, OF PORTLAND, INDIANA.

## STEAM-PUMP.

SPECIFICATION forming part of Letters Patent No. 494,207, dated March 28, 1893.

Application filed June 20, 1892. Serial No. 437,354. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE R. KENDRICK, a citizen of the United States, residing at Portland, in the county of Jay and State of Indiana, have invented certain new and useful Improvements in Steam-Pumps; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

My invention relates to that class of steam pumps in which the steam and water pistons are rigidly connected and moved in adjacent cylinders, and has reference to the method of controlling the valve for admission of steam, and also to the general construction of the pump in all particulars.

My object is to provide a pump of this class with a compound piston working in adjacent cylinders operating a rotary valve by tappets projecting from the steam cylinder in such manner as to throw the valve wide open at an early point in the stroke of the piston, and preventing a possible stoppage of the valve by a mechanical device controlled by a spring or other equivalent means outside of the cylinder and steam chest the working parts all being inclosed in a casing covering both the steam and water chambers and the water valves.

Further, the invention consists in utilizing the space between the ends of the steam and water cylinders as a steam chest, and locating the rotary valve for admitting steam to the cylinder in this space.

In the accompanying drawings,—Figure 1 is a front elevation of the pump. Fig. 2 is a longitudinal vertical section through the steam and water cylinders with the pistons and valve in elevation. Fig. 3 is a vertical longitudinal section through the water side of the pump, showing the valves and valve chamber and water ports. Fig. 4 is a horizontal section through the water cylinder and valve chamber. Fig. 5 is a vertical section on line 5—5 of Fig. 3.

Referring to the drawings,—A is the steam cylinder of the pump, in which moves a piston

A', carrying two heads A<sup>2</sup> A<sup>3</sup>, and connected by a bar A<sup>4</sup>, carrying pins A<sup>5</sup> A<sup>5</sup>, for operating a lever controlling the action of the steam-valve C.

B is the water cylinder in which moves a piston B', of similar construction but smaller diameter, connected rigidly to the steam piston by a port D.

Inside of the steam cylinder, at a central point, is mounted a semi-circular cap valve C, for controlling the admission of the steam to either end of the steam cylinder. This valve is pivoted at *c*, to the face plate E, and carries on its rear side projecting lugs *c'* *c'*, and on its pivot a rod C', loosely mounted on the same, one end of which, *c*<sup>3</sup>, projects into the path of movement of the tappets carried by the steam cylinder; the other end *c*<sup>4</sup>, projecting between the lugs of the valve. Outside of the face-plate E, and connected to the valve stem is a short pointed arm F, rigidly attached to the valve stem, its point resting in the depression in the upper end of a telescopic rod G, consisting of two members G' G<sup>2</sup>, held normally apart by the pressure of the spring G<sup>3</sup>. The lower end of this rod is pointed and rests in a conical depression in a projection E' from the face plate E. The semi-circular valve is hollowed out in the inner side as shown, and adapted to make connection between steam ports *e e* connected by steam passages with either end of the cylinder, and an exhaust port *e'*, connected through a controlling valve H, with an exhaust passage *h*, and an exhaust valve I, communicating with the water chamber of the pump, or an exhaust pipe J, communicating with the outer air.

Referring to the parts already described, which include the steam side of the pump, it will be seen that the steam enters the steam inlet pipe K between the two heads of the steam and water cylinders, and is admitted to either port by the movement of the cap-valve, the space between the pistons acting as a steam chest, and the pressure of steam in such space acting to hold the semi-circular valve in place against its seat. The movement of the piston from end to end causes the tappets to strike against the lower end of the valve-controlling rod, and through the lugs on the back of the valve, to throw the

same over its center, at which point the pressure of the spring mounted between the members of the telescopic rod G, throws the valve wide open, thus admitting a full head of steam to the piston.

Referring to Figs. 3, 4 and 5, which illustrate the water side of the pump, L is the valve chamber separated into two parts by a partition L', the lower chamber being connected by water ways l, with the water cylinders, and having mounted within it the induction valves l', said valves being held in their seats partially by the action of gravity and partially by the pressure of the water on their upper surfaces. These valves project upward through the partition, separating the two parts of the water chamber, where they are surrounded by annular bushings upon which are mounted the eduction valves M, said eduction valves being made in the shape of a short closed cylinder covering the upper projecting end of the valve L.

The action of the parts is as follows: The water enters the lower chamber N, through the pipe O, and as the piston moves from one end to the other of the cylinder the lower valve is raised, and the cap valve M, acts as a stop to limit its upward movement. As the piston returns, the pressure of the water and the force of gravity throw the valve L', downward and lifts the valve M. As will be seen by reference to the drawings, the exhaust valve from the steam cylinder is held against its seat by a spiral spring and makes communication when open with the water space N. The course of the exhaust steam is controlled by an index cock H, and it may be thrown either into the

incoming water or into the pipe communicating with the air.

Having thus described my invention, what I claim is—

1. In a steam pump, the combination of the compound piston working in adjacent steam and water cylinders, water inlet and discharge valves connected with the water chamber, a semicircular cap valve mounted in the steam cylinder and operated by a lever thrown by tappets connected to the steam piston, and a spring device outside of the steam cylinder connected to the valve and operated to throw the same off its center.

2. In a steam pump of the character described, the combination of the adjacent steam and water cylinders, the pistons moving in said cylinders and rigidly connected to each other.

3. In a steam-pump of the kind described, the combination with a steam and water piston moving in adjacent cylinders and rigidly connected to each other, of a semi-circular valve operated by the movement of the piston, and an exhaust passage opened and closed by the movement of the valve, an exhaust valve connecting with the water chamber, an exhaust opening connecting with the air, and an index cock for controlling the course of the exhaust steam.

In testimony whereof I affix my signature in presence of two witnesses.

GEORGE R. KENDRICK.

Witnesses:

W. H. HARKINS,  
T. W. KENDRICK.