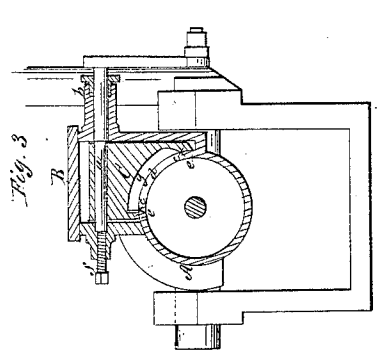
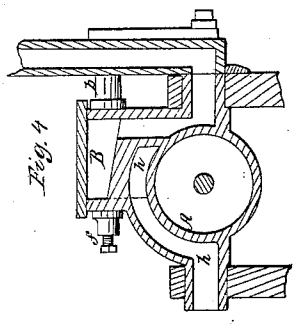
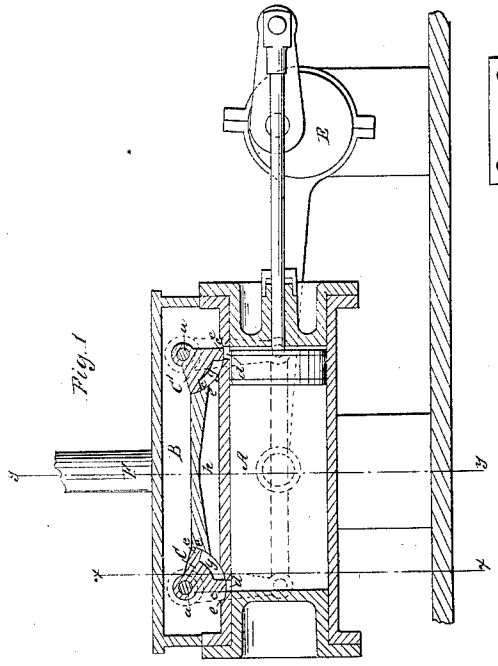
H. E. Woodford,

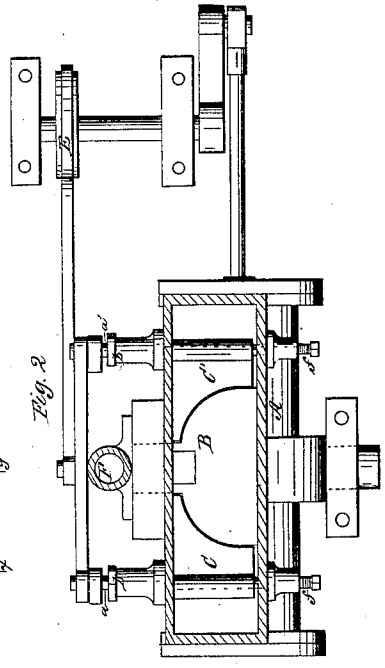
Rotary Steam Valve.

No. 30,550. Patented Oct. 30, 1860.









Witnesses;
R. S. Spencer
J. W. Coombs

Inventor;
H. E. Woodford
per Munn & Co.
atty.

N. PETERS, PHOTO-LITHOGRAPHER, WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

HENRY E. WOODFORD, OF WATERTOWN, NEW YORK.

VALVE FOR STEAM-ENGINES.

Specification of Letters Patent No. 30,550, dated October 30, 1860.

To all whom it may concern:

Be it known that I, HENRY E. WOODFORD, of Watertown, in the county of Jefferson and State of New York, have invented a new and useful Improvement in Induction and Eduction Valves for Steam-Engines; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a vertical section taken longitudinally and centrally through the cylinder and steam chest of an oscillating engine having my improved valves applied. Fig. 2 is a plan of the same with the cover of the steam chest removed. Fig. 3 is a transverse vertical section of the same in the plane indicated by the line x, x, of Fig. 1. Fig. 4 is a transverse vertical section of the same in the plane indicated by the line y, y, of Fig. 1.

Similar letters of reference indicate corresponding parts in the several figures.

To enable others skilled in the art to make and use my invention I will proceed to describe its construction and operation.

A, is the cylinder of the engine. B, is the steam chest, F, is the induction steam pipe, and C, C′, are two valves, one for the induction and eduction of steam to and from one end of the cylinder, and the other for the induction and eduction of steam to and from the other end of the cylinder, said valves being secured to rockshafts a, and a', arranged transversely to the axis of the cylinder in bearings in the sides of the steam chest, one of the said bearings for each rockshaft, being furnished with a stuffing box b, through which the shaft passes to the outside of the steam chest for the connection of the valve gear.

The faces c, c, of the valves have their sections, taken transversely to their axes as represented in Fig. 1, of the form of arcs concentric to their respective rockshafts, and have their sections, taken directly through their axes as represented in Fig. 3, of the form of arcs concentric or nearly so to the axis of the cylinder, the said faces increasing in radius from one end to the other, the larger ends being near the stuffing boxes. The seats e, e, formed on the cylinder for the said valves to work in, are of corresponding form so that the length of the passages d, d, is only equal to the necessary thickness of metal for the cylinder. Both ends of the valves are exposed to the pressure of steam, and the excess of pressure on their larger ends keeps them steam tight in their seats; but at the smaller ends set screws f, f, are screwed through the sides of the steam chest as shown in Fig. 3, to form end bearings for the rock shafts and thereby to prevent the valves bearing in their seats in such a manner as to produce excessive friction.

The valves represented are formed with cavities g, g, to effect the eduction of steam from the passages e, e of the cylinder to an eduction passage h, in a substantially similar manner to that in which it is effected by what are known as **D** slide valves but in some cases I propose to use separate valves—four in all—for the induction and eduction of the steam, two working in connection with passages above and two in connection with passages below the cylinder, and in such case no cavities in their faces will be necessary; and in some cases I propose to use a valve having a so formed cavity in its face that with suitable ports in its seat it may serve to effect the induction and eduction to and from both ends of the cylinder.

In the oscillating engine represented, the induction and eduction are effected partly by the movement of the cylinder itself and partly by the oscillating movement of the valves effected by the valve gear which is operated by an eccentric E, on the crank shaft; but in an engine with a stationary cylinder the induction and eduction will be effected wholly by the oscillating movement of the valves effected by suitable valve gear of such character as is commonly used for working oscillating valves and for some slide valves.

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

The employment of valves C, that have an increasing radius from one end to the other and that are adjustable with their axes of motion, in combination with cylinder A, and chest B, when said valves are constructed and arranged to operate in the manner substantially as herein shown and described.

H. E. WOODFORD.

Witnesses:

LYSANDER H. BROWN,

HENRY CURRIER.